WORK

An Illustrated Magazine of Practice and Theory

FOR ALL WORKMEN, PROFESSIONAL AND AMATEUR.

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A SUMMER FITMENT FOR THE FIREPLACE.

THE time has now come when means and methods will be sought by which the black, comfortless, unused fireplace may be embellished or hidden, and our shops will soon display the latest novelties to meet this demand. Amongst the many patterns and designs which will be shown, will be the new screens or fitments which are intended to entirely enclose the fireplace: they will be of more substantial make than the printed cards, etc., generally used, being made of wood, with shelves for plants or china, and panels of Japanese matting, paper, plush, and other materials; the wood work being enamelled in various light tints, such as cream, salmon, bird's-egg blue, etc. The construction of these fitments being simple renders them a very suitable article for the amateur cabinet maker to try his hand upón, and when made there would be a place for them, not as is the case with most amateurs' goods, there being no use for them. Thinking it may be an acceptable novelty for some, I propose to briefly describe how one may be made quickly and effectively.

Pine or American white wood is the wood required: packing cases some might suggest, but that depends upon the amateur being a "glutton" for work and desirous of spending his energy on working out dents and bruises, rough knots, nails, etc., but, as a rule, I think the amateur likes to see the result of his work as quickly as possible, so the quickest way is to get from a timber yard the wood required, which in this case is not much.

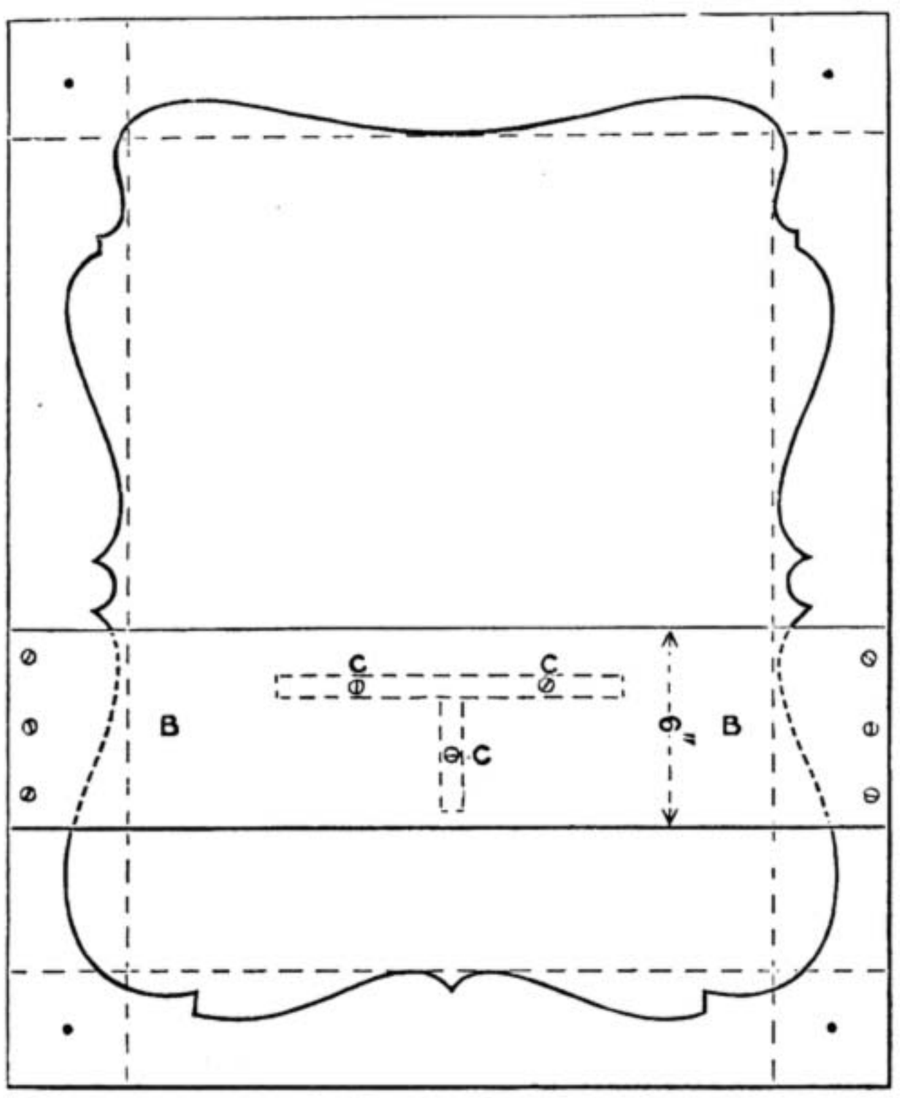

Fig. 2.—Shaped Frame for Fitment, as seen from the Back, showing Strip to support Bracket.

Fig. 1 gives an idea of the fitment about to be described. It consists of a shaped frame of enamelled wood surrounding a surface of Japanese matting, from which projects a shelf supported by a bracket. The width and height of frame must of course depend upon the space to be covered in, and should be measured exactly so that the frame may fit tightly and be self-supporting.

Having ascertained the size, cut two strips the full height and two strips the full width from a so-called 1 in. board 4 in. wide, one strip 6 in. wide the full width, and a piece for the shelf 14 in. long by 6 in. wide, whilst the bracket will require a piece 4 in. each way; this is the wood required. The four 4 in. strips are to form the shaped frame, and the 6 in. piece is to fasten at back to carry the shelf. To make the frame it requires the corners to be halved, as shown in Fig. 4; before that is done the wood should be planed and edges squared. The wood being thus prepared, lay one end across the other, as in Fig. 3, at right angle, and mark underneath the board from B to C; repeat this to the eight ends. Then with a gauge draw a line, A, at exactly half the thickness of the wood, so that when the half of each end is cut away, the two ends being placed together will form the exact thickness of the board, as shown in Fig. 4.

Having carefully marked the ends as

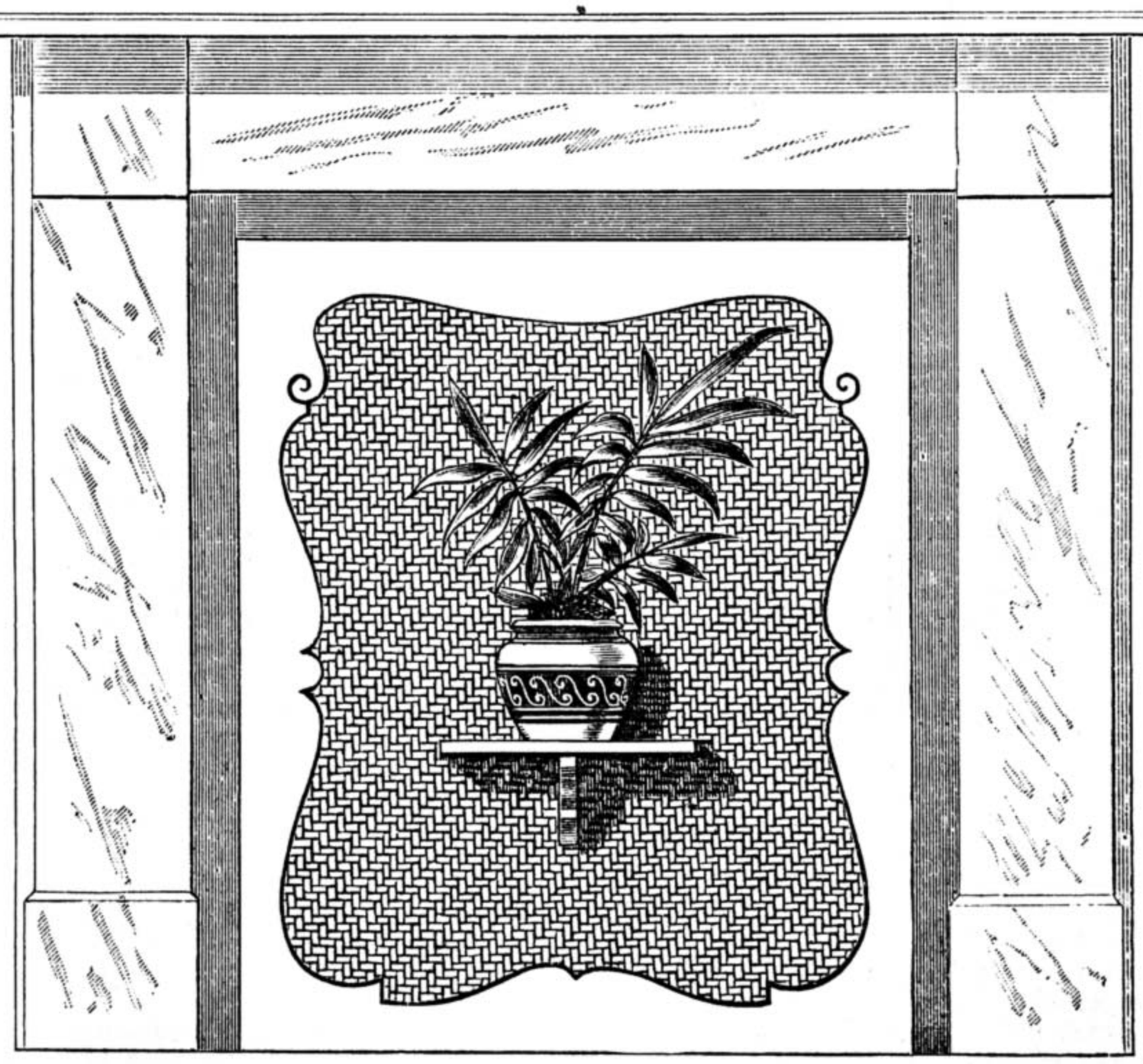

Fig. 1.—Summer Fitment for Fireplace complete.

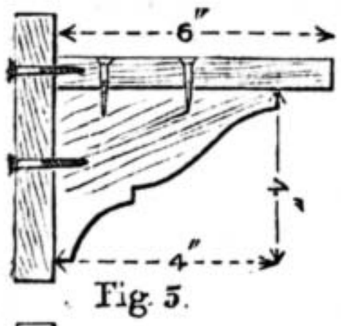

Fig. 5.

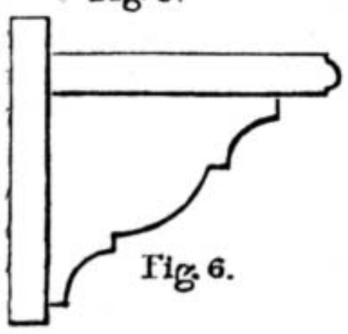

Fig. 6.

Figs. 5, 6.—Alternative Brackets to support Flower Pot.

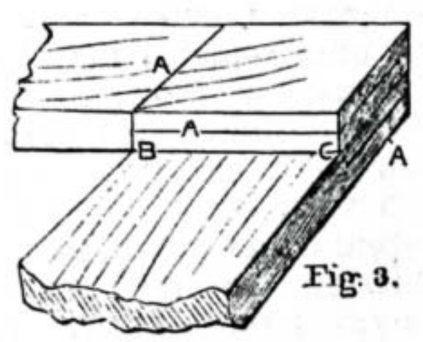

Fig. 3.

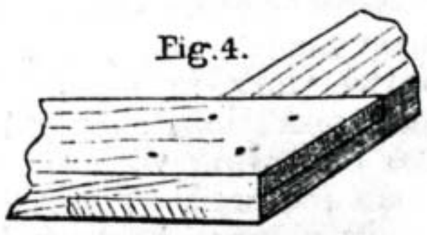

Fig. 4.

Fig. 3.—Halved Joint set out.

Fig. 4.—Halved Joint set out, completed.

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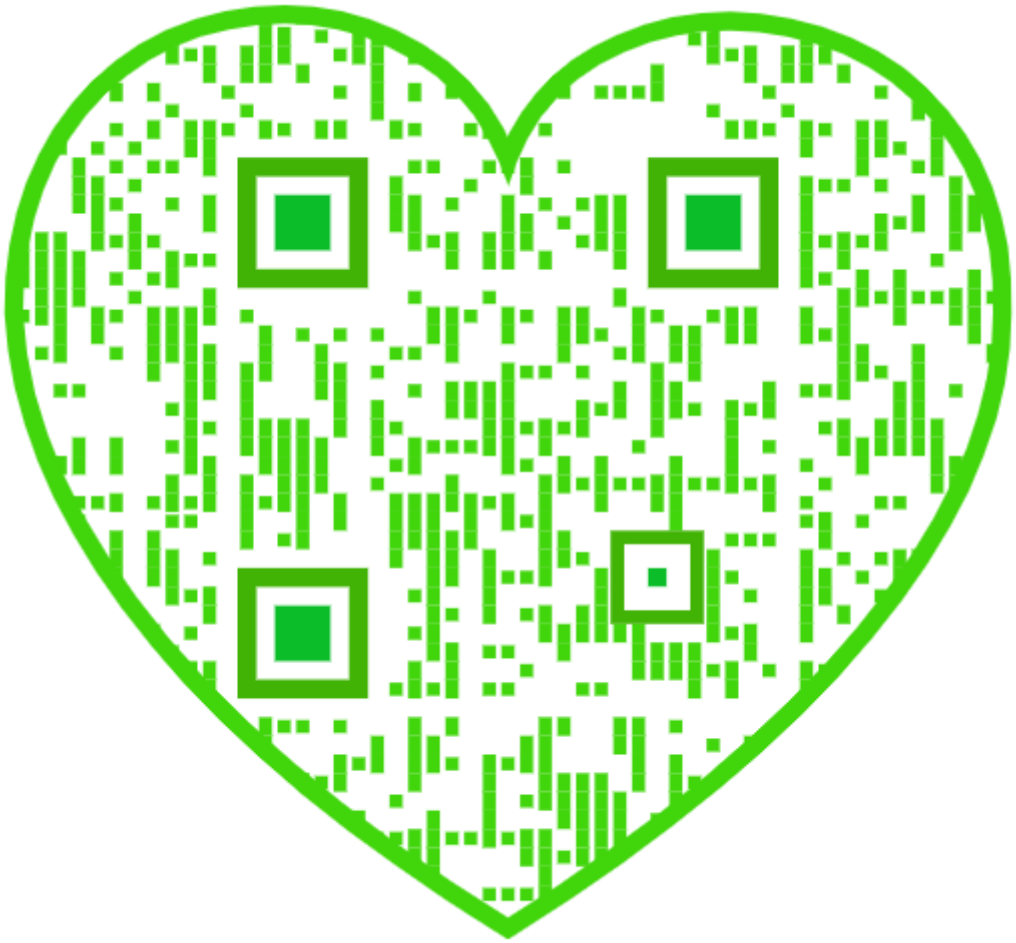

directed, place the board in bench screw upright and cut down as far as the cross line, taking care that the saw does not deviate from the pencil line, then saw on the cross line till the half comes away, and then with a chisel remove inequalities and saw marks, that the two halved pieces may bed exactly. Now fit the frame together, and secure at each corner by a brad just sufficient to hold the pieces together; rub a little whiting or chalk on face, which will enable the line to be more plainly seen, and also allow alterations in drawing, and set out the shaped line to be cut as in Fig. 2. It is better to fix the frame in position, and then trace out the shaped outline, than to draw on each piece separately, as it will better be seen where the line will pass from one slip to another, and thus enable the workman to avoid the chance of the line not exactly following on. When the setting out is completed, the pieces may be knocked apart for convenience of handling whilst cutting. After the cutting out of the shapes is finished, well glass-paper the edges, keeping the face-edge sharp; the frame can then be glued together and a few brads driven through corners, avoiding bruising the wood with the hammer. Whilst the glue is setting clean up the shelf, the top edge of which can be rounded or bevelled to take off the thickness; also cut out the bracket and fix it to shelf by two screws passing through shelf into bracket, Figs. 5 or 6, well sinking the heads. The curved lines at top of frame in Fig. 1 are cut out with a V chisel.

When the frame is fit for handling, give a final clean with fine paper, and stop cracks that may show in joints with wax; also cover screw heads in shelf with the same; it is then ready for enamelling. Three thin coats should be given to obtain an equally flat and glossy surface. The Japanese matting, or other material that may have been chosen, is then to be tacked on at the back. The 6 in. strip of wood is then to be secured to the frame over the matting, at the height that may be thought best according to the proportion of frame, as in Fig. 2, and long thin screws passed through that into shelf and brackets, Figs. 5 or 6, and c, Fig. 2. The summer fireplace fitment is then completed.

NOTES FOR ELECTRO-PLATERS.

BY GEORGE EDWINSON BONNEY.

V.—SILVER ANODES—NICKEL ANODES—COPPER ANODES—BRASS AND GERMAN SILVER ANODES—ANTIMONY—AMPÈRE—AMMETER OR AMPÈRE-METER.

Silver Anodes should be made of pure silver, sheet or ribbon, $\frac{1}{8}$ in. in thickness, well annealed. All that has been written respecting gold anodes in the preceding paragraph may be applied to silver anodes. The anode-plates may be suspended from the anode-rod by wires of pure silver, or hooks of the same metal. Alloyed anodes, even to a small extent, contaminate the bath with copper, and the alloyed deposit presents a dark tint, instead of the beautiful whiteness so much admired in electro-deposited pure silver. The deposit is also hard and intractable under the burnisher.

Nickel Anodes should be made of pure rolled nickel plates, of a thickness suitable to the work in hand. Small anodes for small operations should be thin, the thickness increasing with the superficial size of anode required. Plates of cast nickel are always clumsy, because heavy and thick; they are also brittle and porous, whilst the pores are apt to contain impurities. Mr. A. Watt, author of "Electro-deposition: A Practical Treatise on the Electrolysis of Metals," states that he has found "a considerable percentage of loose carbon—graphite—interspersed with badly-cast nickel. The advantages claimed for rolled-nickel anodes over the cast metal are:—The constant and steady way in which they give off the metal; they never become soft or fall to pieces while in the bath, as cast-nickel anodes do; they may be light and thin to begin with (of course, being far less costly in consequence), and they last a very long time." The firm of Messrs. H. Wiggin and Company, Birmingham, has a good reputation for best rolled-nickel anodes. Anodes of nickel may be suspended from strong hooks of copper, inserted in holes punched or drilled in the nickel plates.

Copper Anodes should be made of electro-deposited pure copper, well annealed. The cast-off plates or cylinders from a Daniell battery will do fairly well for anodes.

Brass and German Silver Anodes should be made of an alloy corresponding with the composition of the solution in which they are used, and the desired deposit of metal. They should be well annealed before being used, and may be suspended from the anode-rods by hooks, as directed for nickel anodes. For information on the working of anodes, see *Free Cyanide*, *Free Acids*, etc.

Antimony.—French, *antimoine;* Latin, *stibium.* Chemical symbol, Sb.; specific gravity, 6·71; combining weight, 122; melting point, 800° Fahr.; electric conductivity, 3·88. Electro-negative to all the well-known, and most of the rare, metals; electro-positive to carbon, boron, tungsten, molybdenum, vanadium, chromium, arsenic, phosphorus, selenium, iodine, bromine, chlorine, fluorine, nitrogen, sulphur, and oxygen. Antimony is a bright, bluish-white metal, so brittle that it may be powdered in a mortar, and is easily fusible. "It melts at 450° (C.); rapidly oxidises if exposed to air when melted; and if heated more strongly, it takes fire and burns with a white flame, giving off fumes of antimony trioxide. Antimony is not attacked by dilute hydrochloric or sulphuric acids." (Roscoe.) It may be slowly dissolved in hot strong hydrochloric acid, and in hot concentrated sulphuric acid. Strong nitric acid attacks it and forms a white substance (insoluble in acids or water), to which has been given the name of antimonic acid—a pale, straw-coloured powder, soluble in solutions of potash or of ammonia. Aqua regia dissolves antimony readily, and forms antimony trichloride, otherwise known as butter of antimony. Antimony is a valuable metal, because it forms with some other metals a number of useful alloys. With bismuth, copper, and tin, in certain proportions, it forms Britannia metal, best pewter, and Queen's metal; with lead and bismuth it forms stereotype metal; and with lead it forms type metal. It is also an ingredient in a recipe for fusible metal. See *Fusible Metal*, etc. The electro-deposition of antimony has received the attention of Mr. Gore, who has obtained a series of most interesting results from his experiments. An account of these will be found in his treatise on "Electro-deposition" (*Circle of Science Series*). I am not aware that the deposition of this metal has been put to any useful purpose.

Ampère.—An ampère is an electrical unit of measurement, generally accepted by English-speaking peoples. It is the unit of current strength, or volume of force given by any electrical generator. Its meaning may be learned by comparison with other units of measurement. For instance, in trades where the foot rule is used, the inch is a unit of measurement of surfaces. Where steam engines are used, we speak of pounds as a unit in estimating the pressure of steam; and horse-power as a unit in estimating the work done by steam working through a steam engine. Where water is used as a motive power, we speak of its pressure or "head" as measured by foot-tons; and its volume by square inches, or gallons per minute. In dealing with the measurement of electric force, neither the foot-rule nor the spring-pressure gauge can be used as instruments of measurement, so electricians have had to invent a new set of instruments, and new names for the units or divisions marked on them. The ampère is a work unit, telling of work done, and is calculated on the known power of electric force to do the chemical work of decomposition; that is, the work of breaking up chemical compounds when the current is passed through their solutions. "An ampère is that quantity of electric force which liberates ·000158 of a grain of hydrogen in one second. This is equal to one grain in 6,338 seconds." In the same *time* it will liberate the grain-equivalent of any other element—that is to say, of zinc, 32·5; of copper, 31·7; or of silver, 108 grains. "For all practical purposes, this means 18·5 grains of zinc per hour." Professor Thompson estimates the following deposits of metal to be done by one ampère in one hour:—Nickel, 1·099 grammes; copper, 1·1739 grammes; gold, 2·441 grammes; silver, 4·025 grammes. These figures will represent nearly in English grains:—Nickel, 16·958; copper, 18·115; gold, 37·669; silver, 62·106. The "grain-equivalent" on which these calculations are based is the *electrical equivalent* of each metal; and this differs in some instances from the chemical equivalent, or atomic weight of the same metal. For further information on this subject, see notes on *Atomic Weight*, *Combining Weight*, *Equivalents*, *Valency*, etc.

The ampère is also defined as "that quantity of electricity obtained from an electro-motive force of one volt passing through a resistance of one ohm." If we can determine by measurements the electro-motive force of an electrical generator, and also the total resistances of the electrical circuit, then by dividing the total electro-motive force of the current by the total resistances of the circuit, we obtain the value or strength of the current in ampères. See note on *Ohm's Law.*

Ammeter or *Ampère-meter.*—An instrument for measuring the strength of an electric current in ampères. Various forms of these instruments are made and sold. In one form, the instrument is like a galvanometer furnished with a coil of thick wire surrounding a steel permanent magnet. In all other particulars it is made like a galvanometer, but the divisions on the dial are graduated and marked to represent ampères. In another form, the instrument is made to work out the principle or law that a permanent magnet, being free to move, will place itself across the path of an electric current passing through a conductor near to the magnet. The conductor in this instrument is a broad strip of sheet copper. A magnetised steel needle is suspended vertically on a nicely-adjusted axis close to the conductor, and a pointer of aluminium, or some light substance, is also fastened to the needle, or on its axis. The needle is deflected out of its vertical position by the influence of the

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current passing through the conductor, and these deflections are governed by the strength of the current passing through the instrument. These two forms of ammeter cannot be relied upon to give exact readings for any length of time, because of the tendency on the part of so-called permanent magnets to lose a part of their magnetism, and thus be less influenced by the electric current passing through the instrument. It is therefore necessary to frequently readjust and calibrate the readings by an electrolytic ammeter.

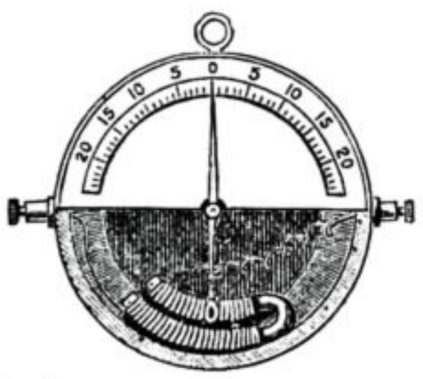

Fig. 2.—Small Electro-Magnetic Pendulum Ammeter: Lower half of Dial removed to show Magnet and Pendulum.

Another form of ammeter is constructed to make use of the well-known property of soft pure iron to become an electro-magnet when wound with an insulated conductor carrying a current of electricity. A piece of soft bar iron is bent to horse-shoe form, and wound with thick copper wire, insulated or covered with silk or cotton. A small pendulum of soft iron is suspended between the poles of the magnet, and a pointer is connected to the staff or axis. The bob of the pendulum is drawn toward the ends of the magnet poles in proportion to the strength of the current passing through the magnet coils; and the pointer shows on a dial the movements of the pendulum. The main objection to this form is found in the fact that much of the current must be absorbed in doing electro-magnetic work and in heating the coils, thus increasing the total resistance of the circuit. The same may be said of those instruments in which solenoids (*i.e.*, hollow electro-magnetic cores) are employed to draw in a movable iron core attached to multiplying gear.

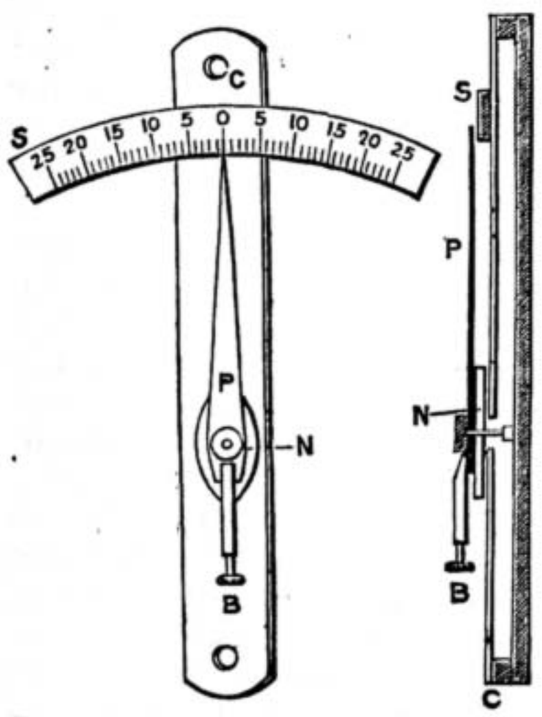

Fig. 3.—Working Parts of Vertical Magnetic Needle Ammeter: B, Balancing Screw; C, Copper Strip; P, Pointer; N, Magnetic Needle; S, Scale.

Electrolytic ammeters, or measurers of electric current, are constructed to make use of the law already given in the note on *Ampères*—*i.e.*, the known ability of the current to do a certain quantity of chemical work in a given time. In some forms of this instrument, two metal plates are suspended from a delicately-balanced beam in a standard solution of the metal composing the plates. The current to be measured, or a known part of it, is made to pass through this solution, and do electrolytic work by dissolving the metal off one plate and depositing it on the other. As one plate gets light and the other heavy, the balance of the beam is disturbed, and it tilts toward the heavy plate, just when a certain quantity of current has passed and done its quota of work. This tilting action of the beam is made to reverse the direction of the current at the same time as it moves gear to register its action; and in this way the work goes on in the opposite direction until the light plate has been weighted by deposited metal. The total work done in a given time can therefore be reckoned up and calculated, and the calculation will show the number of ampères employed during that time. The imperfections found in this instrument are due to friction of gearing, not always constant, and to alteration of the electrolyte, consequent upon changes of temperature and evaporation of solution. There are not, therefore, any perfect ammeters made; but perhaps the best of the electrolytic ammeters may be regarded, after all, more perfect measurers of electricity than the best gas-meters are measurers of gas.

All ammeters have to be calibrated, and their marks adjusted by reference to electrolytic work done in a depositing cell. The method advocated by Mr. S. Bottone, in his book on "Electrical Instrument Making," is as follows:—Procure a generator of electric current calculated to furnish the necessary strength of current; then prepare a strong solution of sulphate of copper, slightly acidulated with sulphuric acid; also two plates of thin sheet copper, at least six inches square. Weigh the copper plate intended to receive the deposit in a balance capable of weighing to the 100th of a grain, and note down the exact weight. Place the two plates in the depositing solution, with the instrument to be graded in circuit with the work and generator. Allow the work to go on for exactly an hour; then take out the weighed copper plate, wash it in hot water, and dry perfectly without rubbing; again weigh the plate, and note exactly how much copper it has gained. If it has gained 18·35 grains, then the current passing through the solution and ammeter measured exactly one ampère, and the plates must be restored to exactly their former position. If the plate has *not* gained this weight of copper, the two plates must be put closer together; if *more*, they must be placed further apart, and the experiment repeated until the right quantity of copper has been deposited in the hour. Then the instrument must be disconnected, and the pointer of the instrument must be allowed to fall back to a zero-mark on the indicating dial. Again connect all up, and mark the part of the dial to which the pointer points as one ampère. The greatest care must be taken to maintain all the conditions of the room and apparatus as they are at the end of this first test. Then increase the current so as to deposit 36·70 grains in an hour, and mark the deflection of the pointer two ampères. All the other degrees required on the dial may be got in a similar manner. Daniell cells of quart capacity will furnish a constant generator, and the number of cells will depend upon the required strength of current, each cell being connected in parallel with the work, not in series.

(*To be continued.*)

A FOLDING CHAIR FOR HALL OR GARDEN.

BY J. H. MOODY.

INTRODUCTION—PECULIARITIES OF CHAIR—PROBABLE DATE OF TYPE—CONVERSION AND ADAPTATION OF FORM—MATERIAL—PIECES REQUIRED—CUTTING MORTISED BARS—PUTTING FRAMES TOGETHER—FIRST FRAME—SECOND FRAME—SEAT AND SEAT PIECES—BACK PIECE—KNOBS—FINISHING.

THE several kinds of folding seat to be met with nowadays are all so good that it is a difficult matter to pronounce any one among them to be the best, and in submitting the accompanying design I am somewhat exercised, because I do not feel assurance enough to proclaim the chair which is the subject of my article to be a better one than those rendered familiar to us by the dealer in cheap furniture; but if I do not assert that all others are failures, or if I do not say that to obtain a better one than ours were beyond the bounds of possibility, I am still confident in declaring that the one I describe is distinguished by a simplicity of construction that will attract the worker, whoever he may be.

Very frequently it so happens that we come in contact with persons who feel disinclined to exert their mental faculties in giving shape to original ideas, and there are also many who are too cautious to tread out of the beaten track. There are, however, a few who bravely venture on notions of their own, and to those I would say that they will find it a good plan to make mental notes of every worthy suggestion that passes within range of their observation. A store of information thus accumulated is worth a great deal when occasion arises for its application, and the assistance that may be extracted from that source is of such practical value, that I make no doubt it was never rejected by our most eminent inventors. For the cautious ones, however, whose faltering progress is like an infant's tottering footsteps, I desire to provide every assistance; their trepidation will not allow them to quit leading-strings, and it is for their guidance I have written this article. These prefatory remarks are patent to all as they acquire experience, and the argument I wish to advance is simply that the so-called spontaneity of invention is neither more nor less than the outcome of a system of observation such as we advocate co-operating with ingenuity. Amidst all this theorising, I fancy that I hear someone say—"Why not buy the seat that is wanted? Surely, from among the many that are to be met with in shops, one could be found wherein reposed all the virtues a folding chair should possess; all labour would thereby be spared." But I who aspire to proficiency in the mystery of carpentry, give answer that "I will have none of them." My aspirations accordingly tend toward making for myself the seat I require, and I direct my energies to devise one, both strong and steady, to be useful alike in the studio or in the garden, yet withal so tractable as to readily fold up into a small compass.

It is true I could find the comfort I desire were I to borrow a chair from the house, but my hardihood would experience a check if confronted by an indignant housewife objecting to the denudation, or perhaps fearful for her furniture, lest adverse weather should arise; consequently I hesitate to adopt those means for securing my ease, for never shall it be said that I at any time deserved the displeasure of the good lady of the household. No! perish the thought. My aim is, and always shall be, to conciliate and not to vex that mind which is so severely adjusted to ideas of neatness and order. Moreover, I have my own "den" to repair to, from whence have issued so many dainty brackets and imposing overmantels, beside other articles for ornament or utility, every one of which was especially intended to gladden the good dame's eyes; there I indulge in litter to my heart's content, for the offence is condoned; there, in solitude, I am accustomed to arrange my plans for work. Perhaps I

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am often reminded of the story which tells of a certain clever youth, of whom no doubt every one has heard, and who, when questioned respecting the originality of a bit of carpentry which he had successfully completed, replied that he had "made it all out of his own head." On the present occasion I, like him, must summon from out of the chaos and lumber of my thoughts the image of my subject, and from another wooden source must evolve the substance: then, presto! I shall have the folding seat that I require.

Not exactly in fact, however, will my conjurations proceed with this juggling rapidity. Oh, dear no! in these matter-of-fact times our sleight-of-hand must be governed by deliberation in order to ensure the magic of success. In strict observance of those canons I, in the first place, give my ideas colour and tangibility upon paper, or, in other words, I make working drawings of the article I am about to manufacture, and having accomplished that, I may then consider the stuff of which it shall be composed.

I will mention that the chair I am about to describe has a peculiarity which distinguishes it from many others that I have seen, insomuch that neither webbing, canvas, or carpet are used in its construction; even the bottom is composed of wood, although its collapsibility is unimpaired thereby, for it will obediently fold up simultaneously with the closing frame, and how all that is accomplished will be made evident as the description advances. This departure, I imagine, will obtain the approval of a great many.

In the absence of authorities bearing upon antique furniture, I am unable to make reference for the precise origin of this form of chair; but the principle of construction seems to have been pretty freely used in Italy in the sixteenth century; and, at the present moment, there are in the South Kensington Museum several specimens which fold up in a like manner; the labels of these pronounce them as derived from an Italian source, and also fixes the period that I have quoted. I have given a drawing of one of these chairs (Fig. 1) for the benefit of any one who may desire to make a similar one, but I ara afraid the bent work will be a barrier to success; let us see, therefore, whether we can adapt the principle to straight stuff.

We find there are certain difficulties besetting the conversion; for instance, curved supports such as are shown in the drawing of the old Italian chair admit of a wide and safe base when the chair is in use, but straight stuff necessitates the placing of the centre, upon which the two frames are connected, rather low, in order to obtain a proper width for the seat at a suitable distance from the floor; the base of our chair, therefore, is narrower, and the top is wider than we would wish them to be, but the lack of stability is not, in fact, so great as it appears to be. See Figs. 2 and 3.

Either beech, mahogany, or oak may be employed in making, but the choice will depend upon the embellishment hereafter to be put on the finished work. If we mean to polish, perhaps one of the two latter kinds of wood is to be preferred; but altogether beech will, I think, be adapted to receive any kind of finish that we shall employ, and whilst it is procured with little trouble, it will render our work of satisfactory and enduring quality, and that I imagine is a result in perfect consonance with the highest ideal of completed work.

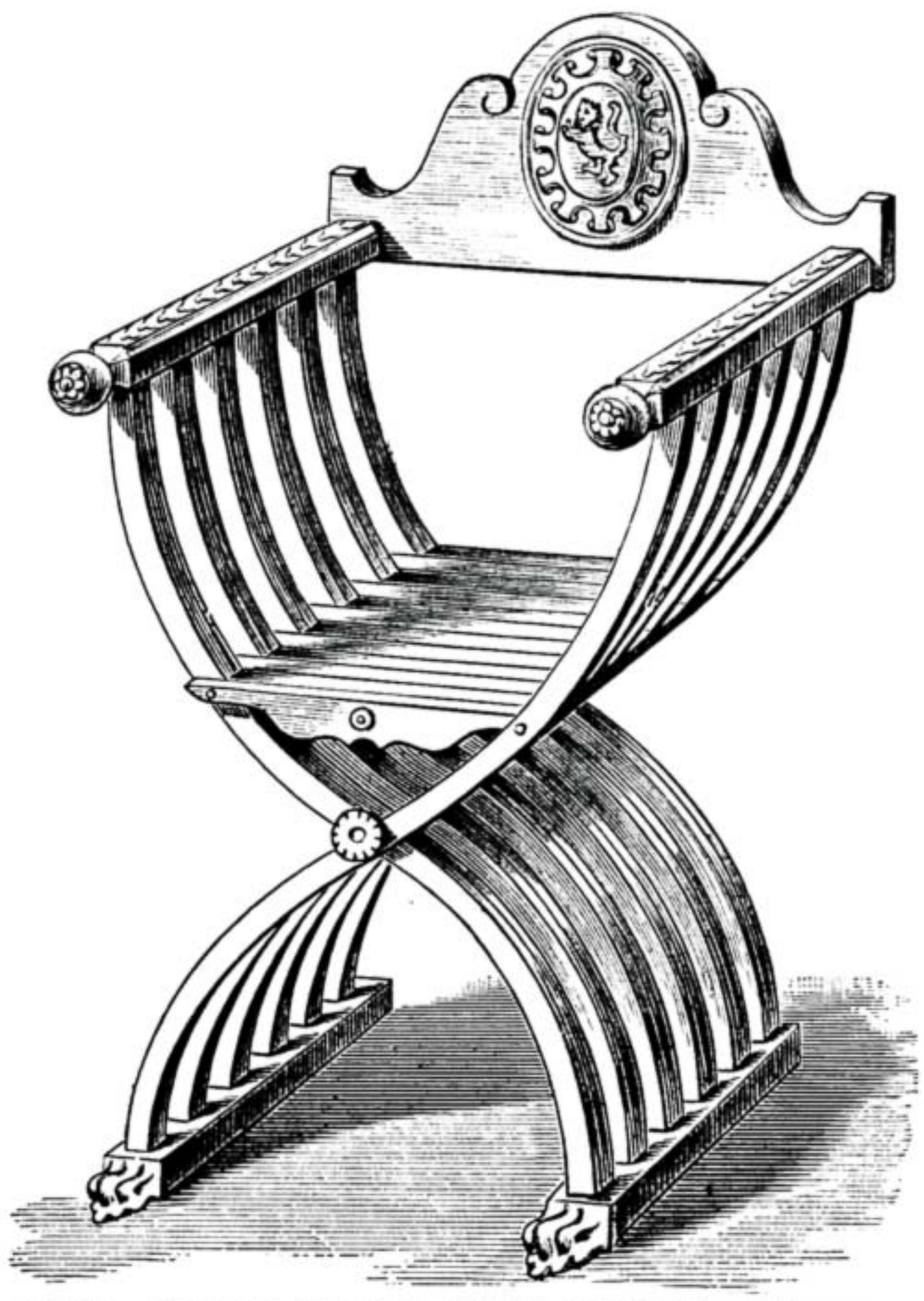

Fig. 1.—Folding Chair in South Kensington Museum. Italian, 1550.

Having procured our stuff, we get out four pieces, each 12 in. long and 2 in. square, and dress one side of them down to an angle, as shown at Fig. 4. These pieces will maintain their severity of shape until the mortise cutting is accomplished; in fact, all items of ornament were best left alone until the rougher work is completed.

The first necessary operation, after the four pieces are cut to the desired shape, will be to set them out in preparation for mortising in the following way: Taking each piece in succession we gauge for ½-in. mortises right along its angular face, then to indicate the exact position of the mortise, we place the pieces in pairs, side by side (Fig. 5), blocked up to level them, and whilst they are in that position, we will rule upon them 11 lines intersecting the gauged lines. These cross lines must be at intervals of 1 in., the first of them being ¾ in. from the front ends of all four pieces as they lie together upon the bench. It will be necessary to mark these front ends to be kept as such, and if we number the division on each piece 1 to 10, our description will be clearer, and annoying mistakes be avoided.

I have said that the divisions will show where mortises are to be cut, but further explanation is necessary as to the manner of doing it. In the first place, we will select the pieces in pairs, respectively, arm or bottom pieces, and mark them individually for right or left, taking note that the mortised face is inwards when the chair is completed. We then take the left arm piece and the right bottom piece, and cut mortises upon divisions 1, 3, 5, 7, 9; next taking the right arm piece and the left bottom piece, we cut mortises on divisions 2, 4, 6, 8, 10. These mortises will be cut at right angles with the angular planed surface of each piece, and they should not be a full inch long, but with a slight rebate in length, in consideration of a shoulder of the tenon at the end of the upright bars. These arm and bottom pieces, now that mortises are cut upon them, may be dressed into shape (Fig 4); the half-round moulding on bottom pieces is extraneous, and is added last.

The preparation of the bars does not necessitate a very profuse description. They are 10 in number, each being a trifle less than 1 in. square, with a tenon cut at either end to fit a mortise; they are 32 in. long between the shoulders of the tenons. Holes are bored in them, from front to back, through each bar with a $\frac{3}{16}$ bit, respectively, at 12½ in. and 23½ in. from its bottom end, that is to say, from the shoulder of the tenon.

We now have before us the necessary number of each of the parts that are required to build up the two frames constituting the supports of the seat proper, and we will put one frame together first, thus: Taking the arm and bottom pieces, whereon the mortises bear odd numbers, and taking also six of the bars, we insert the tenons in their proper places, and use glue to fasten them there; that done, we will put the frame aside to dry. Meanwhile, we provide ourselves with four iron rods $\frac{3}{16}$ in. diameter; these rods will be 10 in. in length, and their ends will be prepared accordingly as tools are available — that is, they may be tapped and fitted with nuts, or they may be filed off taper ready for riveting, and provided with washers.

The first frame being made we may fix up the second one. In doing this, however, the insertion of the bar in top and bottom pieces will not be done at one and the same

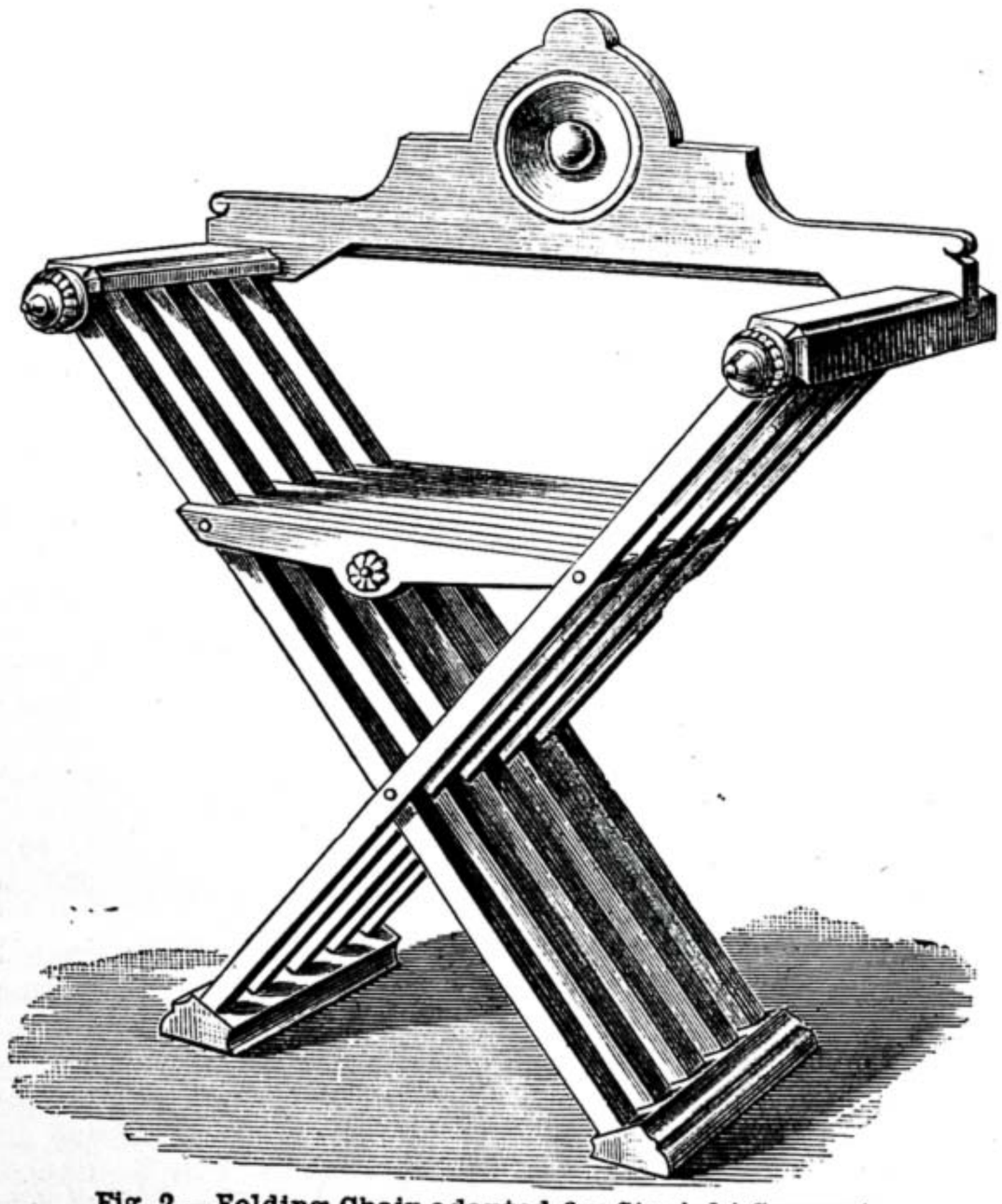

Fig. 2.—Folding Chair adapted for Straight Supports.

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time, or at least we had better proceed systematically, and fit the lower piece with bars first; then occurs the interlacing or crossing of the bars which engages the two frames, and that being accomplished we may attach the top piece and glue all up. I will just mention that unless the interlacing is done with deliberation the amateur will be in an awkward muddle. The proper relative positions of bars and also of arm and bottom pieces must be rigidly preserved; for instance, the first bar of the frame we last made will be inserted behind the first bar of the other frame, and if I repeat that the top piece of the frame we first constructed will be the left arm of the completed chair, it will go a long way to prevent confusion.

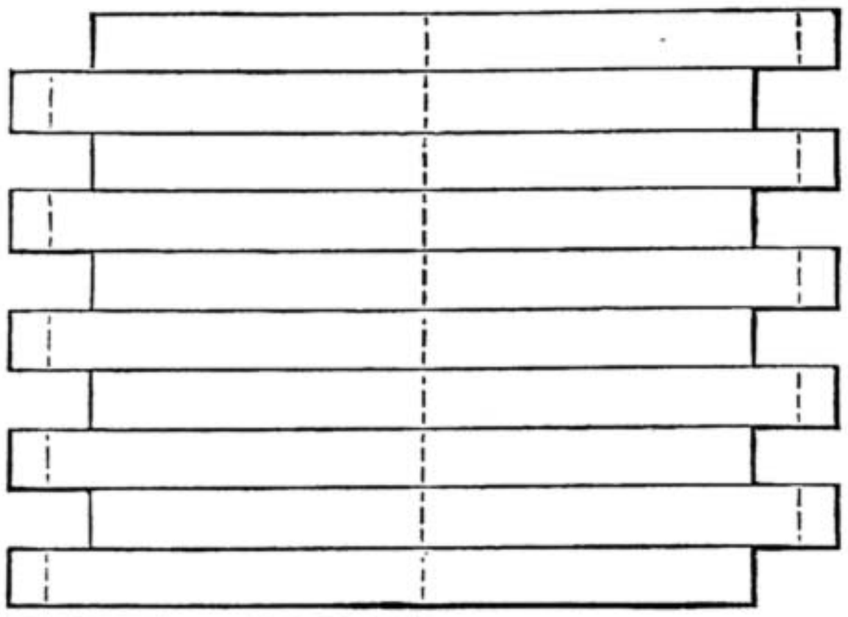
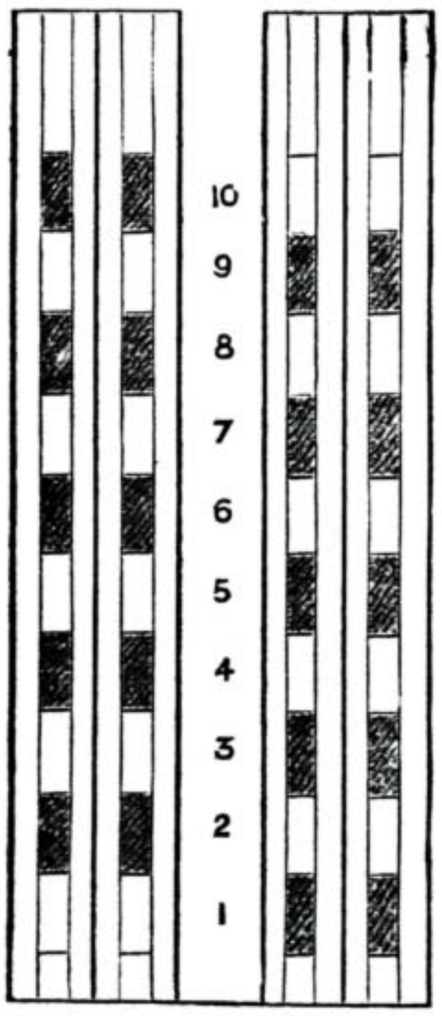


Fig. 6.



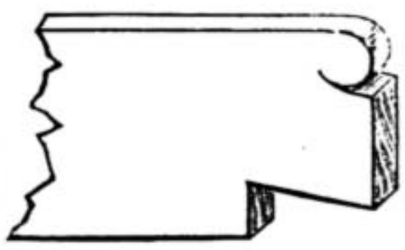


Fig. 7.

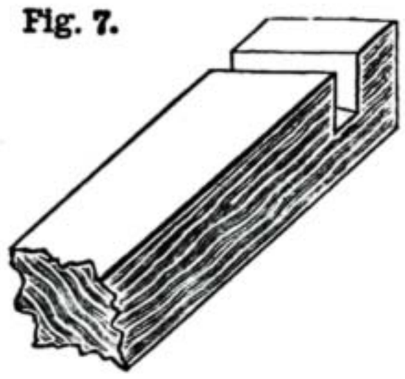


Fig. 5.

The holes in the bars at Fig. 3 are provided as a centre to connect the two frames, therefore these holes when placed in a continuous line will allow the passage of a rod right through the whole of the ten bars; the two end bars may, with advantage, be countersunk rather deeply for the reception of nuts or washers for screwing or riveting, as the case may be.

The frames being ready for the seat, the pieces which comprise it may be prepared. They are to be the same thickness as the bars, and their length may be arrived at by standing the frames open at the required distance, and maintaining their position by tying the top pieces together. I have arranged the drawing, Fig. 3, for a 12-in. seat—it should not be less—therefore, the span across the bars from the top hole on one side to the top hole on the other should be set accordingly. We shall find that our seat pieces must be cut 13¼ in. by 20 in. We get out ten pieces, and cut them at both ends to agree with the angle that the opened frames present. Each piece must be bored with a couple of holes from side to side, and the places for these can be best indicated by ruling lines at ¾ in. to right of centre, and also at ¾ in. from their left-hand edges, across their faces as they lie.

We will suppose that the boring of the seat pieces is completed, and that we have maintained intact their arrangement, but they must be altered in order to get the seat ready to fix. To that end, therefore, we will reverse the position of piece No. 2, but still keep the hole near its centre in a line behind the corresponding hole of No. 1; No. 3 will not be disturbed, but No. 4 will be reversed, so also will Nos. 6, 8, and 10. The seat pieces will then be arranged as Fig. 6, and while they are in that condition we will pass one of the iron rods through the centre holes. We must not omit to countersink the two end pieces before we rivet or screw on nuts.

If the work has been properly done we shall find the projecting ends of the seat will drop easily and exactly into the intervals in either frame; the holes in seat pieces and bars will also agree and be continuous. We prove all this by placing the seat with the bored end of its first piece in front of the first bar supporting the right arm, and with the other end resting on the first bar of the opposite frame. We ought now to be able to slip our two remaining rods right through the holes in seat pieces and bars on either side, and before we fasten them we will test whether the opening and closing of the seat are effected with facility; if not we must take out the rods again, and remove the seat in order to ease the projecting ends that hinder; we may then replace the seat and secure the rods, of course not forgetting the countersinking.

The back piece of necessity is separate, and is of inch stuff; it may be plain or carved according to the design that is chosen. It is cut away in two places to slip on to the back ends of the arm pieces, which are also cut with laps to receive it. (Fig. 7.)

There are now certain items of extraneous ornaments (see Fig. 4) to provide for in the larger knobs which form the terminals attached to the arm pieces, and the smaller knobs or plugs, which serve to hide the ends of the rods at the junction of the seat and bars; these last are to fix into the countersinking; there is also a piece of ¼-in. stuff to form a finish for the front, and which is fixed to the first seat piece.

Lastly, we will deliberate upon the quality of treatment which is to qualify the crudeness of white wood, and which will be the conclusion of our labours. We are offered two methods to choose from: first we have heard of wonders achieved with the enamel paint to be obtained of various makers, severally, and all of which are proclaimed as the best by their proprietors, and there comes to our mind's eye a presentment of how handsome our chair would look if covered with a coat of one of those paints mixed to a neutral tint, say salmon, green grey, or blue grey; but this hint is only thrown out on the supposition that we have worked to a plain design. If, however, the design we have adopted is in any way florid, there are sundry clever combinations of

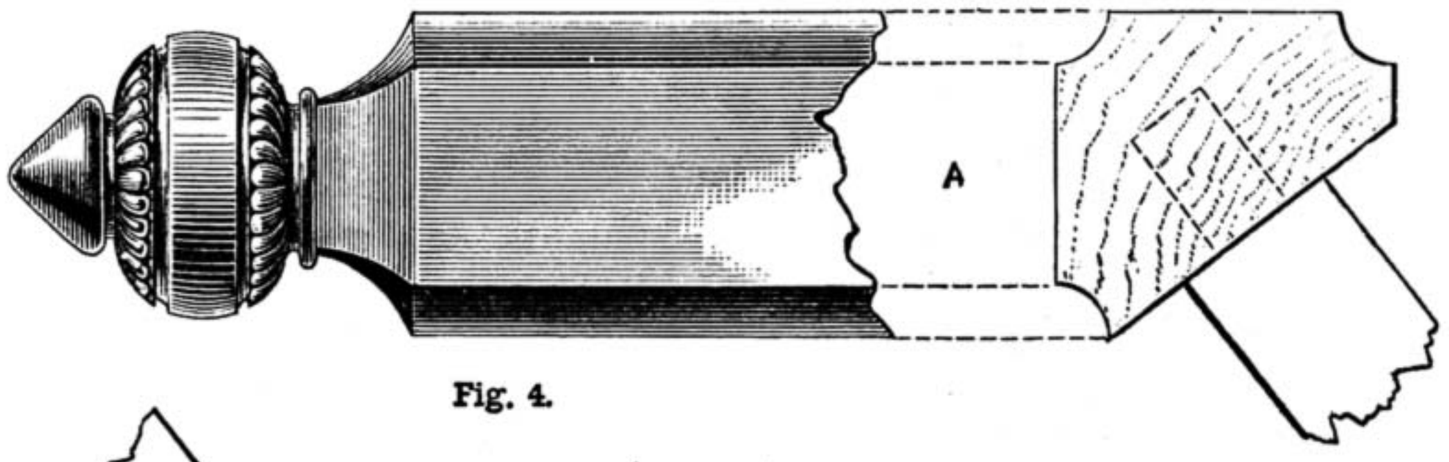


Fig. 4.

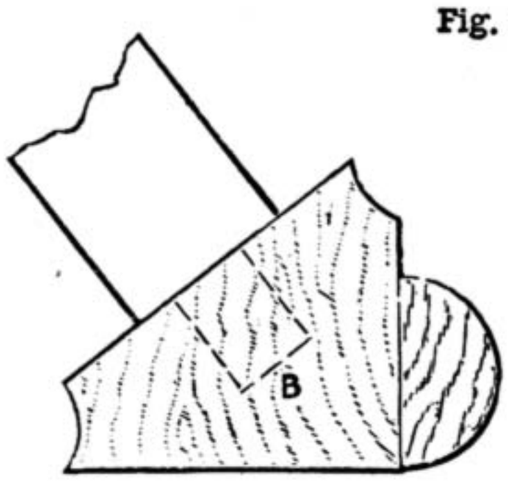


Fig. 3.—Section showing Disposition of Seat Pieces during Closing Operation.

Fig. 4.—Details of Knob, and Section of Arm Piece (A) and Section of Bottom Piece (B).

Fig. 5.—Arrangement of Arm and Bottom Pieces for Mortising: A, Right Arm Piece; B, Left Bottom Piece; C, Left Arm Piece; D, Right Bottom Piece.

Fig. 6.—Arrangement of Seat Pieces in readiness for Fixing.

Fig. 7.—Method of Attaching Seat to Arm Pieces.

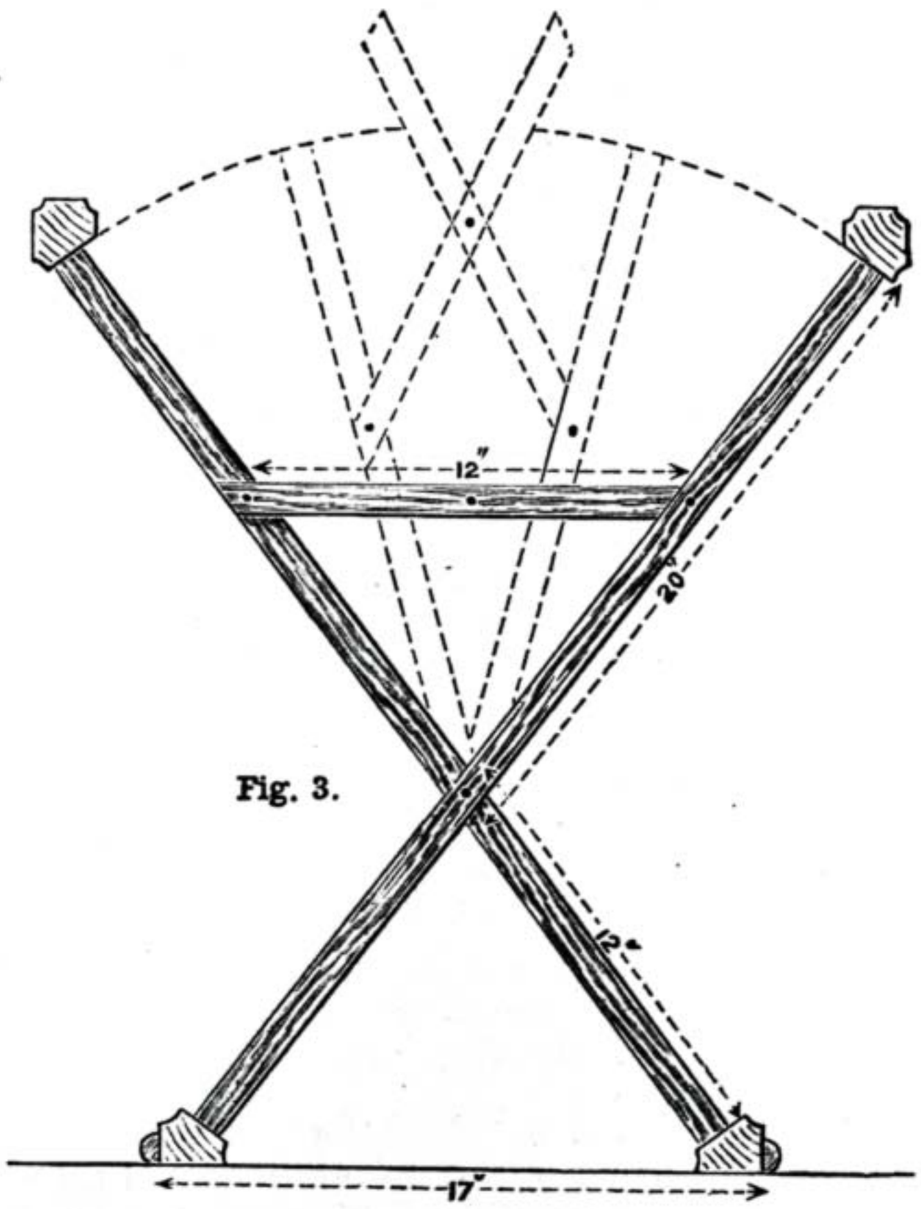


Fig. 3.

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stain and polish which may be used and which likewise will contribute greatly to the good appearance of our work.

In conclusion, I would observe that the procedure of manufacture is identical in both the curved and the strength designs; but those who are unprepared with bending appliances had better adopt the straight work unless they like to undertake the labour of sawing out. However, our chair-maker must measure well his resources before commencing, for when precipitancy lands one in failure, the position is quite as ridiculous to my mind as when hesitancy deposits one "between two stools."

"TIPS" FOR TYROS.

BY OPIFEX.

Useful Indiarubber Cement.

Old tobacco pouches, etc., if made of non-vulcanised indiarubber, may be dissolved in chloroform, benzine, etc. Cut the rubber into thin strips, and put into a stoppered bottle, then add the solvent; let it stand till the rubber swells, add a little more solvent, and shake up well; the strength may be regulated by adding either ingredient; the proper consistency is like that of thick treacle.

This is a most useful cement for many purposes, and will join leather straps, fasten on soles on tennis shoes, etc.; it is also a capital cement for paper, cardboard, cloth, mending books, etc., and one of its chief recommendations is cleanliness, as it will cleanse by being smeared upon the most delicate paper and rubbed off when dry.

Cement for Lathe Work.

The cement used for fastening on the rubber tires on cycles is a most useful article in the workshop, especially for lathe work; the writer has often joined two flat surfaces with the cement when making special wood chucks, etc., and finds that a perfect joint which will stand "anything" is the result.

Heat and coat both surfaces with the cement, and allow it to cool under considerable pressure.

Imitation of Ground Glass.

It is often desirable to muff a window in order, either to shut out an objectionable view, or to prevent outsiders seeing into a room.

The usual way is to "dab" the glass with the end of a paint brush and white paint; this is certainly effectual, but not artistic.

We recommend the following: Make a lump of ordinary putty, *i.e.*, whiting and linseed oil, about the size of an egg, mix it rather drier than for glazing; then add half the bulk of fresh white lead, and about a teaspoonful of gold size. If it is too wet, *i.e.*, if it sticks to the fingers, add a little more whiting, and work the whole well, until it is perfectly "smooth."

Roll into a ball and apply by pressing upon the glass, which should be thoroughly cleaned first. In this way a good imitation of ground glass is procured, which may be ornamented when dry by using a stencil made of strong paper, in which any simple pattern is cut, *e.g.*, a fleur de lis, or other device according to taste; or a line may be taken out about an eighth of an inch wide, and an inch from the edge of each pane, with a device at the corners, the centre portions being "powdered" with the fleur de lis, etc.; a thin coat of very clear varnish will then protect the muffing from becoming scratched.

If it is desired to imitate tinted ground glass, use any of Aspinall's enamels instead of gold size, as above.

JAPANESE MOTIVES FOR FRET CUTTING, STENCILS, AND SIMILAR PURPOSES.

Illustrated from Native Books.

BY J. W. GLEESON-WHITE.

I.—Of Bird Forms.

To all who are familiar with the silk-sewn flexible volumes of Japanese origin, that when opened reveal such a marvellous wealth of suggestions for decoration, the first surprise at the fecundity of invention, and almost limitless variety of ideas displayed by those born decorators, in no way diminishes with increased knowledge. The more thoroughly one investigates even the popular volumes (that have been obtainable in England for trifling sums, at the principal Oriental warehouses, for the past few years), the more the wonder grows, first, that such novel discoveries in decoration could be possible at this stage of our art-history, and still more that so little of this splendid material has been welcomed by our designers.

That Japanese art has been the fashionable tendency in decoration of recent years, that hundreds of designs purporting to be based upon it have flooded our markets, is patent enough; but to those who really try to grasp the principles of its construction, who realise how thoroughly the instinct of the native artist adapted his ideas, with subtle changes according to the mood of the worker or the object he was decorating; the entirely mechanical imitation of a few details hardly proves that a paraphrase of the real art of the Oriental artist has been even attempted, but that just a few evidently characteristic touches of the lowest class of ornament have caught the popular taste, and satisfied both those who produce and those who buy.

The Japanese books more usually met with in England are reprints of Hokusai's sketches and Battei's bird and flower decorations, with similar volumes of pictorial designs; and a few volumes that, like Owen Jones' "Grammar of Ornament," are composed of patterns rather than pictures. The latter class are especially valuable to all decorators, whether those who design, or those whose handiwork carries the idea into execution. Not only do these volumes reveal thousands of beautiful patterns to be copied literally for borderings, diapers, and panels, they are teeming with suggestiveness for all who can take a hint. It is a simple fact to say that one of these pamphlets, studied carefully, might supply a designer with motives year after year, and yet fail to be exhausted. I myself know of a case where one single page of ornament from, perhaps, the most superb specimen of their skill that is to be found at South Kensington, has supplied a clever decorative artist with ideas for years past. But it is not given to all to take a hint, and there are excellent workmen who may be trusted to carry out a given design accurately and faithfully, but give them an inch of design for motive, and ask them to evolve from it a consistent plan for the decoration of the whole thing to be ornamented, whether a six-inch tile or the interior of a theatre, and they would be at a loss at once.

One of the comic papers started a joke of a certain architect who said he could reconstruct a whole cathedral from a broken piece of its floor tiling, and this pleasantry has been often repeated. Yet it is certain that a design based upon one definite piece of work, and consistently evolved in keeping, would probably yield a more satisfactory result than a medley of accurately copied details from a hundred sources dovetailed and fitted together.

Too often in modern English decoration—supposed to be of true Japanese character—the only idea the decorator has grasped appears to be the half-truth, that Japanese ornament is not symmetrical. That it does not rigidly repeat on one-half of its design the facsimile of the other is, of course, true, but symmetry is not always a merely precise balance of parts. Gothic architects showed that a harmonious whole could be obtained by other ways than the classic repetition of each detail, where, as in an Italian façade, one side of its centre was a perfect counterpart of the other.

Starting with this idea of the Japanese hatred of symmetry—an entirely erroneous one—any haphazard of odds and ends of ornament, always provided it was diagonal or one-sided, has been called Japanese, and the name has become hopelessly vulgarised, and made certain of its achievements marvels of decorative depravity, monstrosities of ornamental crime.

This symmetry of unequal parts is one of the triumphs of Japanese design; if you study a panel by a good artist (for be it humbly said, all Japan was not decorated by *one* artist, and bad taste, although rarer than in England, has occasionally found utterance in Japan), one who is master of his craft, you will find that, although the disposition of the parts is not always upon a geometrical basis, that not a few of the wildest and most unfettered designs resolve themselves into certain regular patterns, on the skeleton of which the ornament has been elaborated.

But of those quite contrary to the spirit which governs European symmetrical ornament, you will find a balance of parts—a mass of design on one side is set against a small group or a few dots of ornament on the other. The Japanese appear to have studied nature thoroughly, for in it, although details are frequently of exact symmetry, yet the disposition of groups of them is rarely, if ever, so, and this apparently unconscious arrangement is no mere illustration of what has been quaintly termed the glorious gospel of haphazard, but the result of a higher sense of beauty than mere arithmetical balance can yield.

Better mechanical imitation of another nation's art than such folly as attempting to modify it before even the rudiments of its laws are known; but if, on the other hand, you patiently study and follow out the Japanese artist's line of thought, and realise his very systematic method, that produces results as free and unfettered as Nature's own decoration, then the foolish absurdities—such as the cheap fire-stove ornaments, the hideous dinner services, and advertising placards that pretend to be in Japanese style, and cause the name to be a synonym for vulgarity and worthlessness—will quickly be replaced by better things.

But as the pages of Work, wide though its programme be, can hardly be devoted to the discussion of Japanese art in the abstract, I propose here to reproduce a few

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suggestive designs for everyday ornament that are original Japanese. Among a hundred volumes I have collected from time to time, as opportunity offered, there are only two that appear to be designed actually for fret cutting; but in others—especially a series of designs reproduced (by order of the Japanese Government) from existing examples of old embroideries—there are not a few that are from *appliqué* work, and the difference between sewing on a self-coloured ground portions of another coloured material to form the pattern, and cutting holes out of a piece of wood for the same purpose, is not very great, for of these designs there are many that, without modification of their detail, may be used for fret cutting or stencilling.

Of the enormous mass of suggestive material in this century of volumes, it is curious to observe how few bear adapting. For the purpose they were designed they are supremely fit, but once attempt to modify them for foreign purposes, and you lose half their charm. By this feature the native artist proves his knowledge of one of the most important principles of true design, if indeed it be not the very first, namely, the perfect grasp of the properties and limits of the material, so that he thinks out his idea in stone, metal, woven fabric, whatever it may be; emphasising the peculiar qualities of his material; knowing that stone is brittle in delicate open traceries; that iron is capable of infinite curves and slender projections; that the threads of a fabric will display themselves, however you try to hide them, and so on. Thus he misses a fatal fault of inartistic modern ornament, where wrought iron is parodied by cast, where fabrics try to look like painted decoration, and where one material apes another instead of being employed in the most natural way to obtain the result.

For if a pattern can be used on stone carving, textile fabric, and applied painting with equal effect, it must needs be either of extreme simplicity, or at best only a passable substitute in each of its applications for a more genuine design, whereby the material itself would be really decorated.

Probably this failure to realise the perfect unity of design and material is responsible for many a failure in the attempts at "ornament in the Japanese style." As one who has often tried and failed, I can speak knowingly and feelingly of the unsatisfactory effect of a beautiful idea, expressed in substances that compel a modification of its details. For example: a lacquer pattern does not come well if cut in fret work, a textile pattern is poor on the flat rigidity of a tile. But apart from this, even when the material to be embellished is similar, the European craftsman often betrays himself in carefully precise finish of some little niggling bit of detail, left with the careless suggestiveness of a sketch in the native original; or else by adding European features that ill accord with the spirit of the Eastern art.

In these papers, therefore, I propose to let Japan speak for itself, and offer not *my* idea of the art of the Rising Sun, but the designs themselves, traced roughly, but correctly, from the actual books. The volumes at my side teem with (doubtless) pregnant sentences of advice and description, but my knowledge of the Japanese language is limited to painfully and piulously minute acquaintance with a few odd words; so all the comment of the Eastern artist must be left untouched. But the designs speak plainly and unmistakably to all who care to hear, in the universal language understanded of all peoples, the picture tongue, that which, before Volapuk raised its hideous standard, was an open secret to all the world, and united again the tribes dispersed at the Tower of Babel.

Fortunately for the accomplishment of my purpose it is that so few of the tens of thousands of suggestions here close at hand are related to either of the subjects that head this paper; or, to put it more correctly, are capable of use untouched as they stand in those branches of workmanship. The gorgeous wealth of subjects in one of these little tomes makes Owen Jones' "Grammar of Ornament" a poor thing in comparison, and the richest museums of European art mere hackneyed repetitions of a few wearied motives, when set against the immense fertility of these Eastern fancies. For they hold not only the splendour of the East, but at least the prototypes of all the West regard dear. Here is the Greek fret, the Gothic diaper, the Celtic knotwork, and the Renaissance arabesque. If I piled up all the flattering adjectives of Murray's stupendous dictionary itself in praise of these things, they would be hardly exaggerated. For conventional ornament and natural devices modified within decorative limits, those who do not hold Japan the most fecund and wealthy, simply thereby prove their ignorance of her stores. To any lover of æsthetic design (and æstheticism, remember, is pure beauty in its first significance), the contrast between the wearisome iteration of the few forms that the West borrowed so early from the East, that we style them European, and the source of these fancies—be it India, Persia, or, last and greatest, Japan—is like comparing an illustrated encyclopædia with the book of nature itself.

It must, in justice, be said, that only a portion of all this store is available for adaptation to English needs; once modified to suit our conventional shapes, it has a knack of losing no small part of its charm. Reproduced exactly, it is sumptuous and perfect, harmonising well with many schools of art, but distorted to come nearer the canons of the other school, it resents the attempt, and hopeless vulgarity is too often the result. For example: at a recent exhibition there was a mantelpiece of marble and stonework, in Gothic style, evidently a commission to a Japanese artist, who had patiently endeavoured to grasp the main features of English Gothic and infuse Japanese spirit into the details. The pointed arch lost its mouldings, natural branches of bamboo replacing them; panels of peach blossom tried to go well under Gothic canopies, but it is needless to recall each detail, as the well-meant attempt was a failure. Yet it is almost certain that Japanese panels, or rich native stuffs, could be employed *without alteration* in the choir of an English cathedral with much less sense of unfitness than the Brummagem metal work and floor-cloth-looking tiles of the most "correct" church furnishers.

But I have said too much in theory, let us go on to practice. Out of the books I named above are two intended, beyond doubt, for pierced-wood work; and here for the first time the Japanese fertility seems to fail. There are about a dozen good ones which I have copied here, but in fairness it must be said the others are comparatively poor. This is owing chiefly, I take it, to the fact that, as a rule, in Japan fret work receives the final labour of carving; and also that these two happen to be the only books of wood design I have been able to secure. The details of the cut-out panels used in the lattice-work screens now freely imported, show that this paucity of material for fret-work pattern is a mere accident of my collection, and not the result of poverty in that school of design. But in the embroidery books are so many designs, intended, no doubt, for cut-out pieces of cloth, that are so perfectly of the character of fret work, that they cannot, I feel sure, be picked out amongst those given by any but an expert in fret design. Having a certain claim to that title myself, I own at once they are precisely the same to me, and when my memory of the actual source from which I traced them fails, I shall be unable without reference to the volumes to pick out the wood from the cut-out cloth designs.

This appears to be against the theory of design advanced in the opening paragraphs, but only appears to conflict with that view. It shows to me, rather, how clear to the artist was the true likeness between art and material, whether it be with a saw leaving the holes to supply the pattern, or with scissors, putting the pieces cut out to a new ground to form the design.

And this leads the way directly to the question of fret design, viewed from an abstract standpoint, singularly disregarded by modern publishers, designers (*mea culpa*), and fret workers generally.

A great authority—Mr. Ruskin—has said, that all fret-work ornament should show the design by *the parts cut away*, not by the part left after cutting. Whether this is an inflexible rule of good taste in fret work I should not care to decide; because, if it be indeed a fundamental axiom, at one fell swoop the million designs in the market are condemned. For, of the great army, not one in a hundred thousand is designed upon that principle.

However the verdict may be, there is no doubt that Mr. Ruskin's advice is sound, and worth following. We nineteenth century people have a power of holding diametrically opposite opinions with a bland severity that would paralyse the strict partisans of earlier epochs. The gospel according to Darwin *and* Genesis (as the author of "Obiter Dicta" wittily puts it), Socialism *and* Toryism, Wagner *and* the Savoy operas, with dozens of other parallel cases, come at once to mind in support of this argument. Consequently, let us believe Mr. Ruskin, and if we cannot discard the more popular faith, let us remember that even the great critic himself is fallible, and can be quoted with contradictory force by those who delight in seeking the flaws of a great man, and love his failings, since they are then in touch with him, rather than his merits, which are transcendentally above them.

The common-sense reasons for the pattern itself being cut out are easy to see. Other things being equal, this style of design is likely to be stronger by leaving wider spaces of uncut wood to add to its rigidity. Again, the stencil-like character of such a design is much more decorative at a distance. And here, it may be said in passing, there are two classes of ornament: one that needs close view, since from afar it fades to an inchoate mass—this is the right style for all background decoration; the other, where the lesser details are so grouped that the bold design, unseen close to hand, is made up by groups of the details, and tells with a new force at a distance. This feature may be best exemplified by quoting its abuse—where, in wall papers, owing to

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unskilful placing, the main features of the design form themselves into diamonds or lines, only noticeable when a large part of the surface is seen at some distance from it. But this applies not only to repeated designs. A small panel painted in all-over fashion like a piece of cretonne, to choose a familiar example, may be very decorative near, but one with just a few shapes, a conventional primrose or star dotted over it, may be more telling at a distance. It is hard to explain these things curtly, but quite needful to keep them in mind, when we come to apply the motives, and vary the theme in its actual working out.

Of the designs illustrated, those numbered Figs. 1 and 2 are distinctly Japanese, the peculiarly conventional treatment of seascape and birds being all their own. If any one doubts which form of art is higher, let him compare these two patterns for fret cutting with those of one of the popular publishers, where ships, and animals, even portraits figure, in horrors enough to scare away gods and men. The depth of bad taste, in some of these terrible instances, is enough to condemn the art of fret cutting for ever.

Fortunately, *all* modern designs are not so bad; even the commonplace German pattern, consisting of capital C's and S's writhing in mortal agonies together, is comparatively harmless by the side of fret-work pictures in English or American fashion. The Japanese artist boldly seizes upon the prominent lines in a rolling sea, suggests a moon rising from it, the toss of the spray, and a bird poised above; without one bit of actual imitation of nature, he yet gives a suggestion of real objects in a way that is both true and good art; and, *in its own way*, as good as the design of the frieze of the Parthenon. "There are bests and best so many," but we may as well have the best of each; good fret cutting is better than bad statuary. There is more real art in a few inches of Japanese wood work, a rough bit of Indian pottery, or a bit of old English wrought iron work, than in the white marble atrocities of the modern Italian school of sculpture.

These two designs (Figs. 1 and 2) would need enlargement for all but very skilful workmen. The usual plan of ruling squares to one scale all over the design and copying on a much larger set of squares may be resorted to with ease and success. There is a sectional tracing pattern, covered with pencil-lined squares, sold in various sizes that simplifies this process, and avoids disfiguring the printed copy.

More of these conventional ornaments derived from bird forms are to be seen in Figs. 3 to 13. Some are most pictorial in their scheme, others merely symbols of the prominent features, in the shape of a bird. Take Fig. 9, for example, a wholly delightful thing, although simplicity itself, yet full of humour. It is so marvellously like a bird, and yet so utterly wanting in all the accepted details. Perhaps no one ever expressed bird-form at once so simply and yet so truly. It is a concentrated joke, a petrified pun, a kind of Japanese witty epigram that once having found

Fig. 1. Japanese Wave Forms, Fig. 2. Sun, Moon, and Birds, Conventionally treated, showing effect in Stencil.

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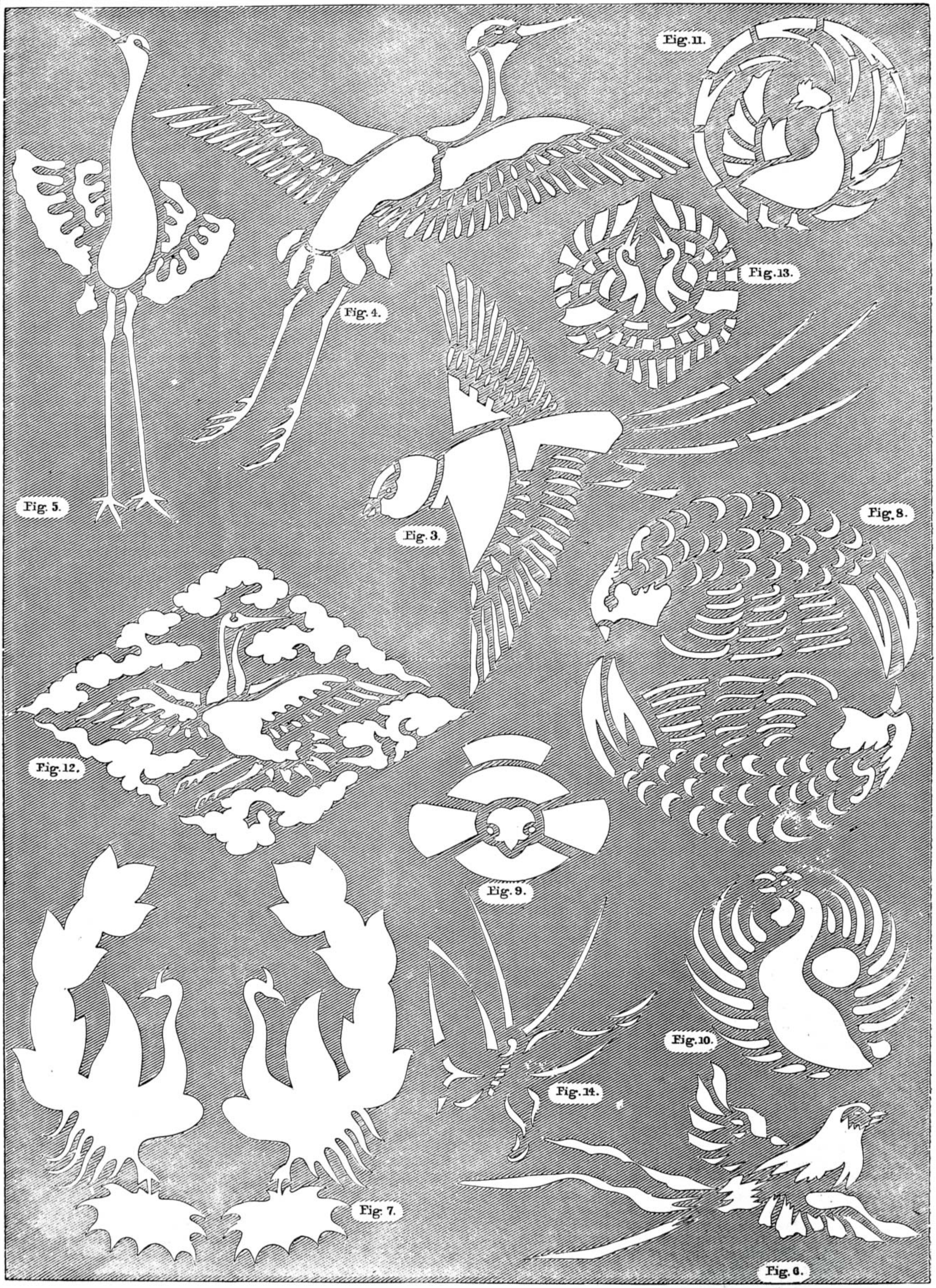

Figs. 3-13.—Japanese Bird Forms. Fig. 14.—Insect Form conventionally treated for Fret Sawing and Stencilling.

The New York Academy of Sciences Digital Collections

voice, said, the only wonder is, that so evident a truth was not uttered ages ago. Yet this little bird is an excellent decorative spot in itself; whether used at irregular intervals or repeated in regularly designed order over the whole pattern, it is fit and proper, aiming at nothing more than it amply performs; a verdict that would not disgrace all that can be said of the highest art.

Fig. 14 and others to appear are insects treated in like fashion. Birds again form the motive of Figs. 3, 4, 5, 6. These, if worked on a small scale, might, perhaps, be still more simplified; but if enlarged to about five or six inches, the details will not be so minute as to afford special anxiety on that account.

Figs. 7, 8, 10, 11, 12, 13, are excellent specimens of what I have tried to explain in the former part of this paper. They are decorations good and adequate, if looked at by themselves; when seen at a distance, the circular (or diamond) shape they offer tells us a distinct ornamental effect. To grasp this fully, notice how unshapely a blot the average fret-work bracket is when viewed from across a room, whence it appears a nondescript outline, no more truly adorning the wall on which it hangs than would a damp duster hung on the same nail.

Some of these designs may be used even in the small scale for which space is found here, but most will bear a certain amount of enlarging without loss. There is a limit, however, to this alteration of scale, and rather than lose the design by too great an increase in its size, it is best to choose a plan that will admit of two or more repetitions of a more handy size.

(To be continued.)

BINDING MADE EASY.

A CHEAP, STRONG, AND TASTEFUL METHOD OF TREATING PAMPHLETS, MUSIC, ETC.

With a Few Words on Portfolios and Blotting Books.

BY E. BONNEY STEYNE.

(Continued from page 83.)

COLLECTORS know how very rare many of these ephemeral publications become, especially in a perfect state; for, while well-bound books get cared for by all sorts of owners, purely out of respect to their outsides, the mass of ephemeral literature and fragmentary publications—such as reports of learned societies, pamphlets of all sorts, some of them of no slight value in after years—gradually, but surely, disappear. The original of one rare Dickens, already mentioned, I myself bought for threepence, kept it many years, and sold it for ten pounds easily in the open market. In fact, a single advertisement in a literary journal brought me three telegrams from would-be purchasers within an hour of the time the issue was on sale. But that pamphlet had chanced to escape free and scatheless from all mischief; yet this personal instance will show that a careful preservation of much comparatively worthless material may be at the same time guarding treasures for the future profit of the possessor.

In the method still under consideration, the stitches visible at the back demand a covering, but the covering need not be applied all over like the parchment. It often answers the purpose to put a second strip of buckram (or even white paper) over the stitched back, mounted so as to adhere to each cover only and be free from the back itself. If this is used, any sort of paper (a dull blue or grey wrapping paper looks excellent with a white back) may be used for the sides, cut as in Fig. 7; if it is desired to simulate corners, the way they should be cut out and mounted previously to using the paper for the sides is explained by Fig. 9.

The side papers being pasted, an inner piece of plain paper with a flyleaf—in other words, a piece like a whole sheet of note paper—the size of the pamphlets themselves should be pasted inside each cover; pieces of tin should be placed between the cover and the unpasted leaf, and the back left awhile in a press or under a few heavy weights.

There is another method I have used with success, more particularly for sheet music and larger periodicals—such as two or three numbers of the *Magazine of Art*, or the Christmas numbers of the illustrated papers; also for books already bound, after a way such as Cassell's National Library, the Pictures at Play, Shilling Shockers, and other railway literature. In this case I fold a piece of stiff cartridge paper the size of the music or magazine, as the case may be, and paste it at the inner margin on the top and bottom of the little pile of numbers or single volumes to be bound. Then I paste a piece of buckram over the backs as though they were one solid book. When this is dry, the several pieces (or the series of numbers that compose a volume) are stitched to this buckram back, exactly as described in the other method. Having made a portfolio the precise size (in the way about to be explained), I glue the buckram and insert it in the portfolio when the glue is quite dry, pasting the leaf of cartridge paper to the cover at either end. This method has been entirely successful. I have books of music that have been in constant use for the last ten years, and are practically as good as the day they were finished. For music, noting the increased comfort in its use when the volume opens easily and keeps open without the need of employing a catch on the desk to prevent the pages turning over of their own accord, I candidly prefer this way of binding to any I know. A cheap and nasty way the professional binder would call it, beyond doubt; the clever amateur (and there are many such) who binds his own books in the proper way, would laugh to scorn these feebler attempts, but in the one quality quoted, they will beat any but the very best work. Those who have known how few books will keep open where you leave them, unless they are old and with broken backs—to use the slang of the book trade—will agree that it is no slight gain to have secured this one feature.

Some books are improved by the addition of ribbons to tie, and keep the volume closed. Especially is this the case with MSS., quarto, or folio volumes, such as we use for the offspring of one's own invention, or the transcription of other people's efforts.

Besides the usual way of securing ribbon or tape for this purpose, there is another, probably of Japanese origin, that is still easier to apply, and much more effective when applied. But first to the orthodox method. At a point about an inch inside the cover, and midway in its height, you make a slit with a sharp penknife, the width of the tape or ribbon, after the paper for the sides is pasted on, and before the inner flyleaf is pasted down; then the tape is inserted, leaving an inch or so to be pasted to the inside of the cover, when the flyleaf secures it there, so that the ribbon itself, or the cover, will yield before it quits its place.

In the other plan, the ribbon, in one length, is carried all round the back (as shown in Fig. 10), showing over the back, disappearing for a short distance on either side, and coming out again at a suitable place to tie the volume and its contents.

This form of cover makes admirable blotting books, which sell well at bazaars, and make most useful and acceptable presents. When covered with the gold Japanese paper, or some pretty brocaded material, and tied with a wide ribbon of suitable colour, they are really delightful adjuncts to a writing-table.* The way they are made is exactly like the portfolio, with a narrow band of ribbon or elastic sewn inside, to refill with blotting paper at pleasure. The usual shape is to cut the ordinary sheet of blotting paper down the back and divide the half sheets. But I have made many, cutting the whole sheets once across, thus giving an oblong quarto in place of the usual upright quarto. This is at once more novel, more suitable for decoration, and more convenient, as the lesser height goes better on a writing-table, and yet opens out a wider surface for use when writing letters. This subject comes so naturally into home methods of binding that the digression must be forgiven.

But to hark back to materials suitable for our covers. There is a thin whity-brown material, a sort of canvas, that music-sellers use for the portfolios in which they keep their stock, that is pleasant to touch, cheap, and durable. Also a grey calico or linen that looks sober and quiet. But after all, the best thing is for each to adapt the nearest material to his purpose. Given a little natural ingenuity, it is surprising what good notions are arrived at by sheer force of circumstances. Then, again, the subject matter has much to do with a fitting binding. A privately-printed poem, of a few pages, sumptuously produced on rough hand-made paper, may fitly be adorned with a regal brocade, or a certain amount of finery that befits the subject; but what adorns an Oxford Prize Poem would be absurd upon a blue book or a sheaf of scientific tracts. I have seen a Bible bound in cretonne cornered with a lily of the valley pattern, but I cannot conscientiously recommend the innovation.

To make a portfolio strongly and neatly is—or ought to be—within the limit of every one's skill. Few things are more homely in any household with musical, literary, or artistic tastes, than a sufficiency of portfolios of various sizes. The usual music folio is excellent for sheet music, but to hold part-songs on the one hand, or etchings and drawings too large for it on the other, it becomes an untidy makeshift. The materials for a portfolio are cheap, the process is simple, and the cost slight. With very little practice a good portfolio, equal in every way to the best that are on sale, may be made for a few pence.

The cheap German millboards are retailed at fourpence a sheet in small towns, perhaps as low as twopence in large ones. This stuff is rather nasty to cut, but a sharp penknife and a straightedge of wood soon accomplish the severance. Beware of trying scissors or even shears, unless they be of the bookbinder's gigantic variety, upon this material. There is a quiet

* I made one recently of a white and gold-tinsel brocade, sold at Liberty's at 4s. the yard, tied with a wide yellow ribbon, that was really a thing of beauty.

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obstinacy about millboard that beats the best scissors. Anything more hopeless than to see a well-meaning female trying to cut a complicated shape in thick cardboard with a pair of embroidery scissors, is hard to parallel. With a T-square mark out the needed size in pencil. Then placing the millboard on a flat surface—the kitchen floor, if no table that will be allowed to receive a chance cut is available—place a straight piece of wood up to the line, and press the left hand firmly on the wood. First pass the knife lightly down the line, and then, in a succession of quick sweeping strokes, persevere until the millboard is parted asunder. The straightedge may slip; if so, woe betide unwary fingers. A tin tack on the left-hand side of the edge, top and bottom, if it be a long cut, will help the inexperienced to accomplish their purpose, by keeping the ruler firmly in its proper place. There is only this one way to cut a clean straightedge to cardboard; it is worth practice, for all scissor cuts are abominable, and must be ruthlessly condemned. Having cut the millboard to the required shape and size, or procured some of the thrown-aside advertising cards so freely bestowed on every tradesmen, or even the tops and bottoms of the cardboard boxes such as linendrapers use, the next thing is to decide upon the covering. If old cardboard is used, it often happens that paper pasted on it raises blisters on the already existing paper, which defy any efforts to disperse them; once having risen, there they stay; whether it would be possible by cutting each one, laying it back, and pasting it, to press it down again, I cannot say; but even if so, it really is not worth the labour, for new millboard is very cheap. For use under chintz, cretonne, canvas, or any woven material, or under thick Japanese gold leather paper, any roughness of surface is of small account; but for marbled paper, or still more if smooth self-coloured paper is to be used, it is extremely important to have the millboard itself smooth to ensure a good finish.

Although embroidery is lavished in its various forms upon all sorts of purposes, I do not ever remember seeing it used for portfolio covers. I have noticed it in German illustrations of fancy work, but there is always a latent suspicion that many of those fantastic electrotypes that do duty in the fashion books and illustrated magazines for lady readers all over Europe are creations of the inventive genius who produced them, and destined never to take tangible form, but to appear in rotation in all the civilised countries of Europe, in one fashion paper after another, and then go to the end of all their kind, the waste-paper basket.

Yet embroidery might well be pressed into the service, but as that art is most probably outside the scope of this magazine, it is enough to have mentioned it, and to pass on to practicable materials. First, of course, comes leather, but I hesitate to recommend its use, for the reasons before named—that so good a material is worthy of being treated with technical skill. Next comes bookbinders' cloth, cheap, and fairly satisfactory, not very easy to work neatly, and in certain localities difficult to procure in small quantities. Then American cloth may be noticed; but this is clumsy to use, and, speaking personally, not pleasant in its appearance when used; still, it is cheap, strong, and serviceable, and amongst its varieties there is one sort with a dull morocco-like grain, that is not quite so cheap and nasty in its effect.

Cretonne, so rarely used, is often very happy for this purpose. I have made many such for my own music, for the immense variety of patterns available makes it easy to keep all one's portfolios of different design. To those who have fifty or a hundred portfolios in use, it is a distinct gain to remember that such a pattern denotes the particular composer whose works are kept therein. When I hunt for Grieg, I recall a red butterfly design. For Scharwenka, a blue and white; for Moskowski, a red and white; Bach, a sombre green; and so on. To any collector who employs portfolios, whether they hold music, engravings, sketches, botanical specimens, or what not, this grouping of species in distinct coverings is a great assistance to methodical classification. Besides, cretonne wears very well, better than any other cheap material, and I speak from a long experimental trial of various substances. Chintz and printed dress materials answer equally well.

Plain canvas is useful, but gets dirty very soon; buckram, recommended for books, is also too delicate for the rougher use of a portfolio, and soils very soon.

On the whole, for hard work, next to a dark-patterned cretonne, marbled paper is probably the best for wear. Plain paper is neater in appearance, and allows a list of contents to be written on the outside, but it looks shabby long before a patterned one. But it is needless to say more of the materials available; they are legion, and vary in every household.

To begin with the work itself—we may suppose the cardboard to be cut to the size, perfectly square and true, as the T square will ensure, if you use it properly. If cretonne is used, a piece sufficient to cover the sides and back should be cut out; if cloth or leather, it will suffice to cut enough for back and corners. For the back, cut a slip, say, an inch wider each way than the thickness you wish to devote to the back; let this slip also be an inch, more or less, longer each way. For the corners, cut out pieces the shape shown in Fig. 12, and paste these first on each corner, in the way indicated therein. Then paste the strip for the back, lay it on a clean table, and place the boards on it, parallel with each other, and at exactly the same height as the strip, and turn over the ends. See that your corners come with the joints of their covering uppermost; this is a trifle easy to overlook, and worrying in its after effect. Now paste the inner strip to the back; this should be as wide as the back strip, but not so long, being a quarter of an inch shorter than the height of the cover; paste this in its place, and with a bone paper-knife, work it on each edge of the cover, so that it sinks between them, forming a shallow gutter, so to speak, with edges, and leaving the back itself uncreased flat on the table. Now cut your side papers in the shape shown, Fig. 12, measuring them so as to overlap the already affixed cloth, by a quarter-inch or so, both at the back and the corners. Have ready two pieces of lining paper, just a shade smaller than the covers themselves, and having put in the ribbon or tape to tie, as explained earlier in this paper, paste them inside the covers. As the cardboard is certain to warp with the applied moisture of the paste (even although that be the thick bookbinders' paste, proper for such work), it is best to go through these processes as quickly as consistent with neat finish, and then leave the whole under pressure. Where it is practicable to put a block of wood with a rounded back, or a worthless volume the right size for such purpose (I keep a few condemned books for this purpose), the portfolio dries nicely with the back curved to a good shape. If such be not handy, place it to dry between sheets of dry paper, under a board, with the heaviest weights at hand, say bricks, old volumes of sermons, or speeches on the Irish question.

For covering with a material that is used for the whole surface, the process is even more simple; since then it is practically the back slip enlarged to do duty for sides and corners. It is not needful to reiterate the instruction, since the advice for the other will apply to each stage of this also.

Cretonne being curiously hard to paste at times, some sorts taking it as freely as buckram, and others with a fluffy texture that repels the adhesive matter, it is as well, in such a case, to give the boards themselves a good pasting, and thus merely reverse the usual order. For a way to affix label, on which to write name, see Fig. 14.

To add flaps to the portfolios is a rather tedious process; but after all, each flap is but another cover with another back; so that having done one, similar care will overcome the increased labour, and turn out a workmanlike article.

For railway novels in good condition, bound in stiff boards, and all such volumes, a sightly covering may be easily secured by pasting ordinary white note paper over the back, in imitation of half vellum, and covering the sides with a dull blue, sage green, or grey paper. There is usually a loose page of advertisements that may be pasted down inside. Thus treated, and neatly lettered in black (Fig. 15, p. 81), such a volume may take its place among well-bound books, without the degradation that a "yellow back" offers to a well-chosen case of books, decently and quietly bound.

As far as memory of my own failures helps me, I have tried to anticipate the hindrances and obstacles that occur at each stage of the work; but if there be any unforeseen that I can explain, a letter to the Editor in "Shop" will be read, and every effort made to offer a solution of the difficulty.

As the proud possessor of several hundred folios and volumes of my own making, I know the advantage they yield, and appreciate their aid to order, being of an unmethodical character by nature. If, therefore, one who is not precise and accurate praises their use, how much more should such methodical tidy persons—as all readers of WORK must be—be glad to avail themselves of my trivial suggestions.

OUR GUIDE TO GOOD THINGS.

38.—LONDON LATHE AND TOOL COMPANY'S IMPROVED FRONT SLIDE LATHE.

IN this number of WORK I am enabled to place before its readers an illustration and description of a Five-inch Geometric Lathe, constructed by the London Lathe and Tool Company, 37, Pomeroy Street, New Cross, S.E. The lathe presents many features of novelty, the front slide rest being one of the most important. Fig. 1 shows the lathe as used for ordinary wood and metal turning, but it is also supplied with overhead gear, as in Fig. 2, when required for ornamental work. The slide can be moved past the poppet head out of the way when the hand rest is being used, and this will be found very convenient at times. Another advantage of the front slide is that, the face being vertical, chips and grit are not likely to insinuate themselves between the working

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parts, and the saddle being clear of the bed, the lathe will take in larger work than ordinary lathes. Notwithstanding the necessary overhang of the front slide, it is perfectly rigid. The hand traverse of the saddle is effected by means of the handle shown in front. This turns a spiral pinion which gears into another spiral pinion of twice the size, forming a nut on the leading screw. The leading screw is of steel, having four threads per inch; one revolution of the handle, therefore, moves the saddle one-eighth of an inch. There is also a division plate on the front of the saddle, by means of which a movement of $\frac{1}{200}$th of an inch may be determined. This capacity for minute adjustment makes it unnecessary to have a compound slide rest. The absence of a rack is partly compensated for by the rapidity with which the handle can be rotated, and the bed being short, there is no practical loss of time in the movement of the saddle by this method. The tool box, shown in the illustration, is clamped in a socket bolted down on the top of the surfacing slide, which is actuated by means of a handle turning a screw of ten threads per inch. The head is divided into ten divisions, each of which denote a movement of the surfacing slide of $\frac{1}{100}$th of an inch. These minute adjustments give the slide rest all the advantages of a compound slide without its multiplication of parts. The socket which takes the tool box and other fittings is divided down one side and provided with a clamp which gives a better grip than a set screw. The hand rest is made the same way.

The headstock is back geared, the wheels being of gun metal, with machine-cut teeth. The construction is modified so that the front gear wheel is utilised as a division plate. To effect this the common locking nut, which in ordinary lathes passes through a slot, in this wheel is dispensed with, leaving the face of the wheel quite plain, and free for the holes drilled for the index pointer. The clamping is effected at the back, or smaller end of the cone, by means of a nut on the mandrel, which is screwed hard against the cone by means of a "tommy," the pressure being sufficient to lock the gear wheel and cone, and make them revolve together. A great point in favour of this arrangement is that it is evenly balanced, whereas, by the old method of using a nut near the rim of the wheel, it is impossible to properly counterweight it, as its position is different when in and out of gear, consequently, at high speeds the machine is subject to constant vibrations. The index peg is capable of being moved on its stem and adjusted, and this allows of its being shifted from one circle of holes to another, without affecting the accuracy of the work, and without the necessity of arranging the peg holes on an arc struck from the pivot on which the index arm moves. The index pointer is not shown in the engraving, which only shows the boss on which the pointer is fitted.

The circles on the division plate are divided into 192, 180, 160, 120, and 100 holes respectively, giving the following divisions:—

96, 64, 48, 32, 24, 16, 12, 8, 6, 4, 3, 2.

90, 60, 45, 36, 30, 20, 18, 15, 12, 10, 9, 5, 4, 3.

80, 40, 32, 20, 16, 10, 5.

60, 40, 30, 24, 20, 15, 12, 10, 6, 5, 3.

50, 25, 20, 10, 5.

Another feature of this lathe is an ingenious arrangement of mechanism, by means of which the motion of the saddle obtained from the leading screws may be instantly arrested at any given point; or the lathe may be used for plain turning, without disarranging any combination of change wheels which may be on the headstock at any time. This arrangement is shown on the left hand of the engraving. It consists of a rod sliding in two lugs on the front of the bed, a small fork being fitted on the rod by means of a set screw, which fork actuates a sliding clutch. The clutch, when in gear, establishes a connection between the leading screw to the right and the change wheel train to the left. The rod may be set in any position required within certain limits, so that when the saddle comes to the position where a thread should finish, or the work is to be stopped, it comes in contact with the rod, and the clutch is thus thrown out of gear. This motion is quite automatic when once set, and saves the close attention which the turner would otherwise have to give to his work when cutting screws or cutting up to a shoulder. It will be understood that to set this mechanism, the saddle must be put in a position where the work or thread is to be stopped, and the rod brought against it whilst the leading screw is in connection with the wheel train. The rod is then clamped in position by means of the small set screw on the back of the fork. There is also a provision for driving the leading screw from the right-hand side by means of a small cone pulley, which fits on the end of the screw, and is driven by another pulley on a shaft which runs along under the tool board at the back of the lathe. This is very handy for some purposes, as the clutch may be thrown out of gear, and the leading screw worked for turning without interfering with the arrangement of the change wheels.

The poppet head mandrel is provided with a screw of ten threads per inch, so that a complete turn of the hand wheel advances the mandrel one-tenth of an inch. The body is marked with inches and eighths; thus, an advance of the mandrel of eighths or tenths of an inch can be noted. The headstock mandrel is hollow, to receive rods for turning, screwing, and cutting off short pins or studs in quantities; the back screw being, in this case, removed to allow the rods to pass through. There is a change wheel stud for reversing the direction of the leading screw for cutting left-handed threads. It may be noticed that the holding-down bolt for the poppet head has a deep boss to fit into, and is turned to fit, so that the poppet head will slide without jerking when the nut is slackened out. The lathe is so designed, that the usual bridge or gap piece in the bed is not required.

The gearing between the treadle and the main or fly-wheel shaft is also arranged in a novel manner, which has several advantages over the ordinary method of driving. There is a chain wheel keyed on the main shaft, and another wheel of the same size loose on a spindle carried by the frame of the treadle, as seen in the engraving. The chain transmits the motion and takes the place of a connecting link, with this advantage, that the stroke of the treadle can be varied by slacking off the chain and shifting the position of the lower wheel, in relation to that on the main shaft, both wheels being eccentric on their respective

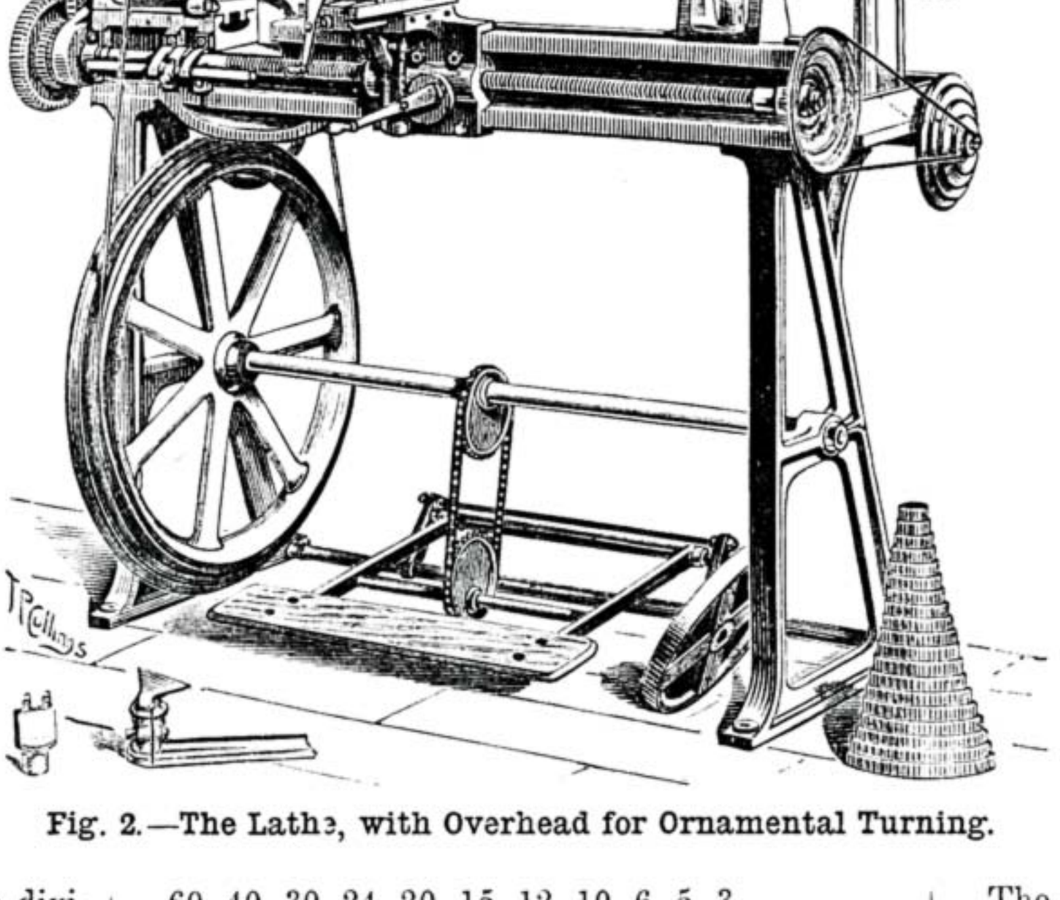

Fig. 2.—The Lathe, with Overhead for Ornamental Turning.

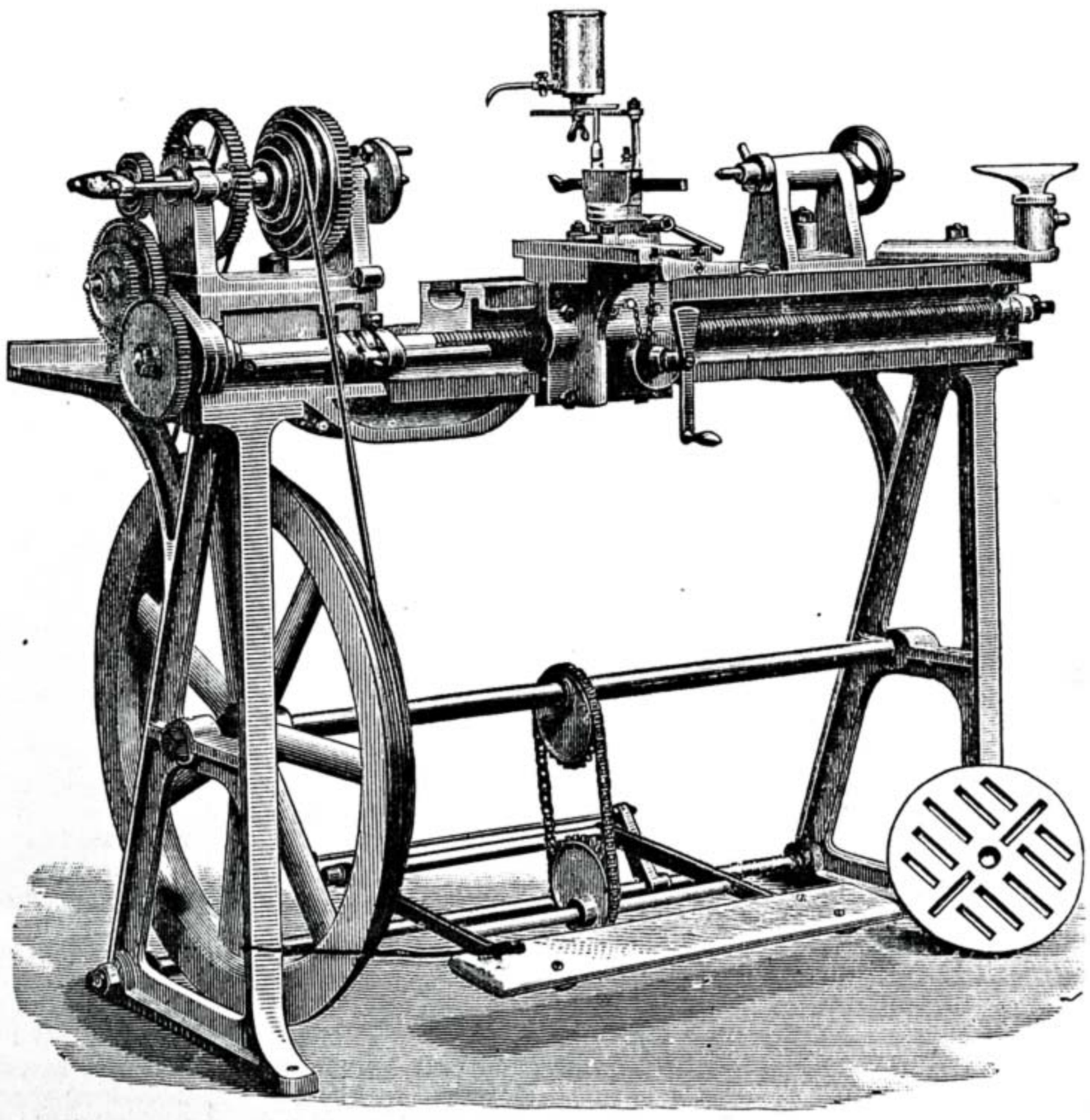

Fig. 1.—Five-inch Geometric Lathe for Ordinary Wood and Metal Turning.

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shafts. There is also an arrangement by which the pivots on which the treadle moves may be raised or lowered, or its position altered, by moving the arms shown at the back. The treadle may also have a quick return, or a quick descent, by altering the position of the eccentric wheels in relation to one another.

There is also a neat arrangement for retaining the oil poured on the bearings, instead of letting it run on to the floor, and returning it again to the pivots. This consists of a little brass cup, fitting over the ends of the main shaft, and so constructed as to retain any oil which runs off the centres. The recess of the cups projects over the end of the shaft, and the cups can be moved back out of the way when required. The fly-wheel is fairly heavy, and has five speeds.

There are a variety of fittings designed for this lathe; amongst others there is a vertical slide, a very useful appliance for many kinds of work. Altogether, the lathe is well designed and neatly finished off, the workmanship being of the best all through. For description of overhead shown in Fig. 2, see No. 8, page 120.

One of the Company's lathes is on view in the Science and Art Department of the South Kensington Museum.

SHOP:

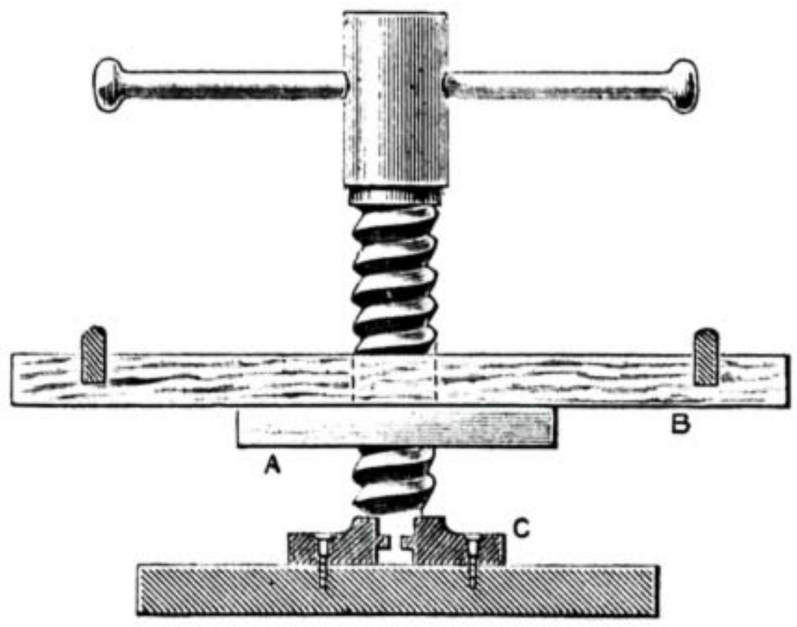
A Corner for Those who Want to Talk It.

**** All Communications will be acknowledged, but Answers cannot be given to questions which do not bear on subjects that fairly come within the scope of the Magazine.*

I.—Letters From Correspondents.

Preservation of Pianos.—Progress writes:—"I notice in your second issue of Work, a cutting from a contemporary on the subject of the 'Preservation of Pianos.' As you invite criticism, and I consider the information misleading to your readers, I need hardly apologise further for writing to you. In the first place I venture to remark that it was not written by a practical man; I will go further, and say, or by a man who had seen a piano constructed. The sound board is not forced into the case so tightly that it bulges in the centre, nor is it forced in at all, but is fitted to the back of the piano before the case is made. The mode of construction of the sound board is thus:—Some selected Swiss pine boards ⅜ in. in thickness, and about 6 in. wide, are jointed together, edge to edge, until the required width is obtained, after thoroughly drying, and being gauged to the requisite thickness. Bars of spruce wood from eight to twelve in number are glued in a vertical direction across the back. To give the sound board rotundity on the front, the edges of the bars are planed round in their length. These bars are placed on after the bridges. It is then thoroughly cleaned with scraper and glass paper, and varnished on both sides to protect it from damp, and make it resonant. I have never heard of a sound board splitting for want of moisture, but often when the wood has not been dry it has shrunk, and so caused the splitting. As to placing a vase with a wet sponge in it under the piano, it is simply absurd. I have before me a catalogue of Chickerings', who claim to be the largest piano makers in America. In it there are some hints on the care of pianos, but I see nothing about a wet sponge or a growing plant. I should say keep the sponge as far away from the piano as possible, because if placed in close proximity to the piano, the damp would be drawn to it, and rust all the strings, and do other damage. If your readers wish to preserve their pianos, I would advise that the piano be placed in a dry room, standing by an inside wall, as a rule behind a door, so that it does not stand in the draught from door to fireplace, as draughts often carry damp air, and cause rust. In sweeping the carpet do not wet the floor near the piano, as the damp rises. See that a fire is lit occasionally in the room in winter time. A piano always sounds brightest when it is kept dry. Keep it well dusted, and do not load the top with books, vases, etc., as these deaden the tone, and often cause noises in the piano by their vibrations. Have your piano tuned at least four times in the year, when it is new; after the first year, three times in the year will probably be sufficient, as the strings would have got settled to their bearing."

Wooden Copying Press.—W. H. D. writes:—"In the second number of yours, which promises to be one of the valuable assistants to all tool users—amateur or professional—I was struck, or, shall I say amazed (Scottice, amused), at or by the long description and perfect draughtsmanship of the amateur's wooden copying press. I have had in use 'another of the same,' which, while being slightly less mechanical in construction, is still as perfect in action, and has the advantage of having the stand ready made, or, at least, handy in most domiciles. Although hailing from the modern Athens, we children of the northern regions of the British Islands are not so far left out in the cold as not to have, as a rule, in the kitchen, a strong wooden-bottom armchair; that forms the stand I use, while Mr. D. Denning is evolving from the depths of his inventive consciousness the more elegant or shapely one to stand in the corner designed for it. The press itself, with its wooden screw, resolves itself into the screw and pressure board. The bar, B, in the illustration, in this case is a bit of birch, tapped to fit the screw, as shown—22 in. long by 3 in. thick and 3 in. wide; two might be strong enough, but that is my size. A strong pin is inserted at the points marking the centres of the arms of the chair, and on the under sides of those a hole is made to receive the two pins. These pins are simply to prevent lateral slipping or sliding, and in this case are of boxwood, but anything will do. The pressure board for the quarto copying-book, in my case, is a flush framed 1½ in. thick, which I happened to have, but any strong piece of timber which will not twist, bend, or give, will do. The attachment of this to the screw is where, I think, this home-made press has the advantage. It is well known that screw nails do not hold well in wood, so to overcome this difficulty, I got a collar turned with a notch made in the screw to receive it, allowing it (the screw) to



Wooden Copying Press.

A, Nut, or Female Screw. B, Bar. C, Circular Catch cut through before being screwed to pressure board.

revolve loosely while working up and down in its nut. Of course, to get it to catch and work, the collar was sawn through before being screwed to the pressure board, as shown in the accompanying tracing from your own woodcut with the necessary alterations."—[You have certainly shown the utmost economy in the construction of your press, but I think Mr. Denning's has a little advantage over yours, although he uses up more material. One slight difficulty suggests itself to me, and that is the shape of the seat of the chair, which ought to exert a pressure on the lower sides of the copying-book precisely equal to that which is exerted by the screw through the pressure board on the upper side of the book. If the seat of your chair is perfectly flat and level, all will be right, of course; but the seat itself, though well adapted for press purposes, can scarcely be comfortable to sit on. I have a wooden armchair on which I sit daily when at work, but the seat itself is slightly hollowed—moulded, in fact, for obvious purposes, and I fear its curved depression would render it unfit for utilisation as the bottom, or *pièce de résistance*, of a copying press.—Ed.]

II.—Questions Answered by Editor and Staff.

Inlaying.—W. H. Dunley.—The Italian and, I believe, also the French mode of inlaying, which is simply fret cutting, is carried out somewhat in this way. Suppose the material is ivory and ebony, two thicknesses of the veneers of each are glued together with paper between; this when dry receives the drawing, which is cut in the usual way; these are separated. The ivory inlaid into the ebony is called *primo*, the ebony into the ivory *secundo*, the latter being considered much inferior. The same principle prevailed, or prevails, with buhl work, in every case a light and a dark material let into each other, so that nothing is lost.

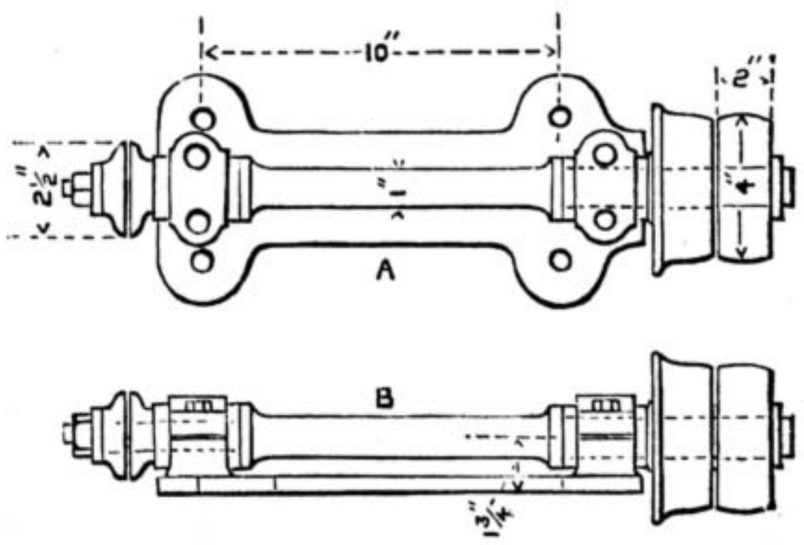
Cupboard Doors.—C. H. J. (*Chelsea*) writes:—"With reference to Mr. David Adamson's article on 'Artistic Furniture,' which appears in Work, in which he gives instructions for making the doors of the overmantel, by halving the styles and rails together and rabbeting the panel in the back, may I suggest the following method, which seems easier for amateurs?—Cut a piece of ½-in. board the length and width of cupboard. Then cut your styles and rails out of ½-in. stuff. Screw the styles on the sides of the board, cut the top and bottom rails in tightly between them, and fix them. Should it be a long cupboard, a middle rail can also be fixed, at the maker's discretion, making it a two-panelled door."—[This mode of making doors is one that is known as "mocking," that is to say, when the effect of panelling is produced by the use of slips of wood, and even mouldings, as you have described.—Ed.]

Wire Thread Fret Saw.—O. F. (*London, N.*) writes:—"The wire fret saw was illustrated in the *Scientific American*—an American paper—some years ago, I think about twelve years."—[Will you kindly try to fix the year in which the article to which you refer appears? Or will any reader who has access to a file of the *Scientific American* take the trouble to make a search for me, and let me know number and date?—Ed.]

Bunsen Battery for Incandescent Lamp.—Electric.—To light up your room of 10 ft. square you should have at least 30 candle-power. This you might get from three 10 c. p. incandescent lamps worked with current from ten quart Bunsen cells arranged in series, the lamps being placed in parallel circuit. The probable cost of each cell would be about 3s. 6d., and the cost of lamps the same, but one can scarcely venture to quote prices here to suit all districts. I do not suppose, however, that you could safely reckon on less than £3 to cover cost of installation. Working expenses extra, for which no estimate can be made. Mr. S. Bottone, Carshalton, Surrey, will give you an exact estimate, and supply you with all necessary materials if you apply to him.—G. E. B.

Leclanché Cells for Incandescent Lamp.—Nulli Cedo.—The thing proposed by you is entirely impracticable. The E. M. F. of a Leclanché cell is 1·40 volts, and it will take at least 50 volts to light your 20 c. p. lamp. You get no advantage in coupling the cells in multiple arc. Even if you used the largest size Leclanché cell for the purpose, it would take at least 36 cells in series to make the lamp glow, and this faint glimmer would only last a few minutes, because the cells so rapidly polarise on constant work. To employ this battery at all on electric light work is like using a tack hammer to forge a ship's anchor. 20 c. p. lamps are also unsuited to electric lighting with current from a battery. Nothing higher than a 10 c. p. lamp should be used. Lamps are easily switched on and off a battery. Cotton-covered copper wire for leads. The cells are charged, then connected to the switch. There is no danger. No danger at all to persons from current generated by batteries used in electric lighting. See replies to other correspondents on electric lighting.—G. E. B.

Sewing Machine Treadle for Circular Saw.—H. W. (*Gateshead*).—You cannot get sufficient power from an ordinary sewing machine treadle and fly-wheel to drive a circular saw through a 1-in. deal. One inch is too thick to be cut without extreme labour, even in a 5-in. lathe with a heavy fly-wheel. Could you not manage to pick up an old treadle and fly-wheel second-hand and rig up a little circular-saw bench? That would be much cheaper than purchasing a saw bench properly fitted. You can buy a saw spindle of any tool maker, price varying with size. A spindle with carriage and bearings for a 15-in. saw costs £6. But you can, if you can work a bit in metal, and get the loan of a lathe, make a spindle for yourself. I enclose a drawing of such a spindle in plan and elevation, with a few leading dimensions suitable for a saw of from 10 in. to 12 in. diameter. The smaller dimensions you can measure from the drawing, as it is to scale. You can make a bench by framing quartering together, and screwing a table upon it. Almost any design will answer the purpose. If you manage to pick up a crank and heavy wheel (it



Spindle for Saw Bench. A, Plan. B, Elevation.

must be as heavy as a 5-in. lathe wheel), and will then give dimensions of it, I will show you how to adapt a table thereto.—J. H.

Steel Straight-edge.—Mechanic.—To make a steel straight-edge 4 ft. long, you must obtain the use of a true surface plate, or true straight-edge, or else you must make two other similar straight-edges in order to get one true. Whatever plan you adopt, you must first rough cut and file your bar of steel to width, and then, before attempting to finish, take out all wind, curvature, or inequality of surface by careful hammering. When this is done, and the faces clean and polished, get one edge as true as possible by filing. If you can test by another straight-edge, or surface plate, well and good. But I judge from your letter that you are dependent on your own resources. Then, in this case, get two strips of dry mahogany to make two other straight-edges, the counterparts of your metal one. I suggest mahogany because it is so much easier to work than metal. If you can get a sale for steel straight-edges, make the two supplementary ones in steel. Take then the strips, and file or plane one edge of each as true as possible. In the absence of a true surface to check by, lay the straight-edges upon a plane face, scribe a fine line by the edge you have filed, then turn the straight-edge over, and try that edge again by the line just scribed. Half the amount of non-coincidence of edge and line measures the amount of

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inaccuracy present in your straight-edge. This you will reduce, and when, by repeated trial, you think it is true, gauge or scribe the second edge parallel with the first, and file that. Serve all three alike. Now, when you try edge to edge you will certainly find that though two may possibly appear to coincide, they will not coincide with the third, when tried edge to edge. By removing material, therefore, carefully, until all six edges of the three straight-edges are mutually coincident, each to each, you will ensure perfect accuracy, and this without extraneous aid. If you do not require absolute perfection, then two straight-edges will suffice instead of three, provided they are not only tried edge to edge, but end for end. Do not spoil the value of a straight-edge as a parallel strip for purposes of levelling by making one edge rounding, as was shown in the sketch accompanying your letter. No true mechanic would be guilty of such barbarism. All straight-edges should be perfectly parallel.—J. H.

How to Distinguish Steel and Iron.—W. L. W. (*Dublin*).—You ask for "a safe and ready method of knowing good steel from iron or bad steel," because you "find it difficult when buying tools to know that the articles are of good quality." To this I may say that iron emits a comparatively dull sound when struck with a hammer; steel gives forth a very sonorous and musical ring. Polished steel has a much more lustrous appearance than polished iron. These are broad distinctions. But when you ask a "safe and ready method of knowing good steel from bad steel," I can only say that this is entirely a matter for experience, practice, and test. You cannot judge of the temper of steel tools by inspection only; you must make trial of them. For this reason all tools by good makers are "warranted," and will be exchanged if found unsatisfactory. You might expect that a tool which shows a high polish is good, but the best guarantee of quality is the name of a maker of recognised repute, and the paying a good price.—J. H.

Riding Tricycle up Hill.—A NOVICE.—You ask for "information as to the best means to assist rider in ascending hills." Kindly give me the following particulars, and I will endeavour to assist you:—Type of machine; size of driving wheels, and to what speed are they geared; length of crank throw.—C. I.

Wire Thread Fret Saw.—C. R. B. (*Edgbaston*).—This fret saw is not yet in the market, to the best of my knowledge. When it is so, and when I am in possession of sizes and prices in and at which it is made and sold, I will mention both in these pages. I am obliged to you for your good opinion of WORK.

Valuation by Cubical Contents.—READER asks how the above can be obtained in all classes of house property. The answer is simple. To obtain the answer considerably less so—*Experience*. When it is taken into consideration that a house occupying the most space may be of the least cubical value, or that two houses built from the same plans may be so varied in the interior that the value of one shall be 3d. per cube foot and the other 4d., what established rule can decide the difference? House property worth 2½d. per cube foot, when several houses are built together, might cost 3d. if built singly. To obtain these varying prices it is necessary, either from plans or from a building of similar structure, of which the cost is known, to take the cubical contents, and so from one to price the other. The information thus obtained is of little value except for that special class of work. Other class property must be treated in a similar manner. But it may not be possible to compare property in this manner. Just so; there lies a difficulty which experience alone can overcome. Comparison gives a clue, but considerable judgment is necessary before one can properly compare one class of work to another. It is easy to find buildings ranging in value from 2d. to 6d. per cube foot, the different prices depending more on quality than quantity. It is an unsafe method of valuing, and I could quote instances in which mistakes have been made by builders of as much as three hundred in the thousand pounds by using cubical measurement. As well guess at the total value at once as guess at the value per cube foot, and I maintain that cubical valuation is more or less of a guess.—JOACHIM MILLER.

Peripheral Speed of Breast Water Wheels.—X. Y. Z. (*Orkney*).—The peripheral speed of breast water wheels is settled on practical considerations, and is usually set at 6 ft. per second—it should not fall below 4½ ft. or exceed 8 ft. per second. For economical working, the velocity of the feed water entering the wheel should be twice the peripheral velocity, or usually 12 ft. per second. This will require a head of 2½ ft., therefore the outlet from the penstock should be 2¼ ft. below the surface of the supply. To find the gross power, multiply the number of cubic feet of water passing per second by 62½, and by the vertical height of fall of the water, and divide the product by 550; the quotient will be the gross horse-power, and the available or effective power will be from 6½ to $\frac{8}{10}$ of the gross, according to the design of the wheel. The height of the fall is the vertical distance between the level of the head-water in the penstock and the level at which the buckets of the wheel empty themselves.—F. C.

Taking a Cast after Death.—A. E. (*Liverpool*) will find this a simple matter as compared with casting the face of a living person. The features should be rubbed over with a very little oil. The beard, moustaches, etc. (if any), should be plastered down with soap, and carefully, as any stray hair which may become entangled in the mould will probably be pulled out. Cloths should be tucked under the chin and all round the face as far as the mask is to extend, and closely, that plaster may not run between them and the skin. These, going along the line of the hair, will protect it; or should it be desired to extend the cast over any part of the hair, that part must be plastered down with soap. The nostrils should be plugged with a bit of oiled cotton wool. The plaster should be put on carefully with a spoon, not poured on in quantity, or it will overflow the cloths and make a mess. It is better to make the mould in two layers, colouring the inner one as in ordinary waste-moulding. No difficulty will be found in removing the mould if no hairs are left loose to become entangled in it.—N.B. In this place it would be impossible to give full directions for all the processes of ordinary plaster casting, but I have articles on the subject in preparation which may, I trust, by the courtesy of the editor, appear before long in these pages.—M. M.

Printing Estimates.—S. A. C.—I know of no English work which treats of this subject. The Russell and Morgan Printing Company of Cincinnati have compiled a series of tables showing the principles upon which estimates should be based. These tables, which are being reproduced at intervals in the *British and Colonial Printer and Stationer* (Office, 58, Shoe Lane, London), would give you all the information you require.

Smiths' Work.—VULCAN.—I am glad to receive so sensible and so practical a letter as yours, and will do all in my power to aid yourself and all young workers at the forge by suitable papers in WORK. Before this can meet your eye you will have read the first of a series of papers on "Wrought Iron and Steel Girder Work," and I have the first of another series on "Smiths' Work" in type and ready for publication. Much beautiful work is now being done in wrought iron, and I have recently seen candlesticks, ornamental brackets, lecterns, and other articles in hammered iron that afforded abundant proof that the ornamental ironwork of mediæval times is on the eve of revival. I saw also a spray consisting of a full-blown rose and leaves wrought in iron, to look on which was to me a genuine pleasure. I hope one day to follow the Sheet of Repoussé Metal Work given with No. 7 with a sheet of Hammered Iron Ornamental Work.

Hat Making.—W. G. H. (*Stockport*).—You ask for "a course of papers on the manufacture of hats," adding that "it is a trade of which little is known theoretically. If you could see your way to give papers on the preparation and blowing of fur, forming, planking, blocking, curling, finishing, dyeing, trimming, etc., you would convey a boon on the neglected hatters." I must confess that I cannot see my way to do what you ask at present, for there is so much to the front to be dealt with already. Meanwhile, hatters will find much in WORK that will benefit them indirectly at home, if not directly in connection with their trade. If a hatter takes up WORK and studies it from week to week it may be instrumental in giving him many a hint and affording many a suggestion that may be of use to him in his trade.

Printers' Lead Castings.—To judge from your sketches and the description you give of your mould for casting printers' leads, you appear to be on the right track as far as this is concerned. Your trouble is that the metal will not run in the mould. The fault, in all probability, is in your metal; try 24 parts lead, 4 parts antimony, and 1 part tin.

Our Advertising Pages.—E. C. (*North Brixton*).—Suggestions are always welcome; no apology is necessary for them at any time, for they are nearly always of service, and we are always glad to have them. I can only say that if it ever be found possible to meet your wish it will be met.

Comment and Criticism.—P. C. (*Leyton*).—I will not give your letter at length, but will content myself with assuring you that nothing will ever appear in the pages of WORK that will be irrelevant and touching on subjects that are best left alone. I sympathise with you in all you say about—but here I must stop, for obvious reasons. No one can detest flippant dealings with sacred subjects, or "profane and vain babblings, and oppositions of science, falsely so called," more thoroughly than I do.—ED.

III.—QUESTIONS SUBMITTED TO CORRESPONDENTS.

Cement Roofing.—X. Y. Z. (*Orkney*) asks:—"Can any practical builder inform me whether cement plaster would do for a roofing material? I mean to nail laths on the rafters, as in inside house plastering, and cover with a coat of cement plaster. Would there be a danger of the plaster cracking or peeling in a storm; and if so, is there no known way of preventing? If practical, this would make a very cheap light roof, and when lined and painted would be very pretty and very suitable for, say, farm steadings. I should much like to know whether it has been tried, and with what success.

Coating for Damp Walls.—R. A. P. wishes to know "the requisite proportions of shellac and methylated spirits on wood naphtha to make a waterproof solution for inside damp walls. How much naphtha to 1 lb. of shellac."

Trade Notes and Memoranda.

AN Heraldic Exhibition is opened at Ghent. The armorial bearings of the early Knights of the Order of the Golden Fleece will form a prominent feature of the show.

THE bridge erected by Lord Burton over the River Trent is 240 ft. long. For the ferry rights at the site a sum of £12,950 had to be paid.

A PUBLIC studio is about to be established in London, under the personal direction of Sir James Linton, P.R.I.

THE piers of the Tay Bridge are founded on silty sand, and consist of two iron cylinders, which are sunk deep, joined together, and filled with concrete masonry. The maximum load is 3 to 3½ tons per square foot. The Paris Exhibition buildings rest on a substratum of stiff clay. Where the gravel was 10 ft. thick, 6,140 lb. per foot was the maximum load allowed; when between 10 ft. and 5 ft. deep, 4,550 lb. was allowed, and the thickness of concrete was increased. When below this depth, piles were driven.

SHEET metal is applied by the Americans to a large number of purposes. One of the more recent adaptations are sheet metal ceiling centre pieces, which can be painted to imitate plaster, or decorated to suit any taste. Lightness and durability are claimed for it.

LECTURING on "Some Newer Modes of Working Sheet Metal," Mr. D. W. Kemp, of Edinburgh, explained recently to the members of the Association of Science and Art that the invention consists in taking advantage to the full of the well-known properties in all ductile metals to flow or stretch under gradual pressure. The improvement claimed over the ordinary methods of hammering, cressing, or spinning might be called flowing, and consists in employing fluid pressure and heat in combination with suitable moulds, the pressure being applied on the sheet metal in such a manner as will force it gradually into the concave or hollow part of a mould, shaped internally to fit the external shape intended to be given.

THE Argentine Republic has a very large foreign trade in proportion to the number of its inhabitants, for the reason that it produces large quantities of raw material, and has, at the same time, very few manufactures. In 1887 the exports and imports amounted to £42,349,840, being equivalent to £9 13s. per inhabitant, against £8 8s. in France, £6 7s. in Germany, £6 in the United States, and £2 4s. in Russia.

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Carving treated in "Work" shortly. Be prepared. Ten sharpened tools, 20 specimens real carving, strop, stone, wood, instructions, etc., approval anywhere, 8s. 6d.—P. PITMAN, Aubrey Road, Mauldeth Road, Withington. [2 S

Tools and Latest Novelties.—Cheapest house anywhere. All amateurs, cyclists, and everybody write for lists, free.—RICHFORD'S Novelty Stores (opposite *Daily News*), 149, Fleet Street, London. [6 R

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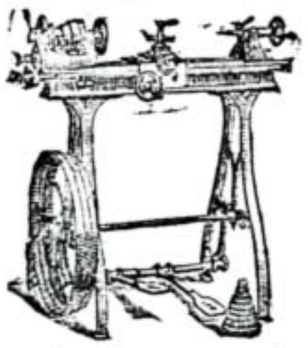

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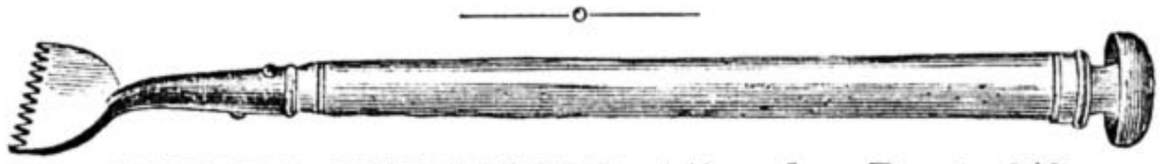

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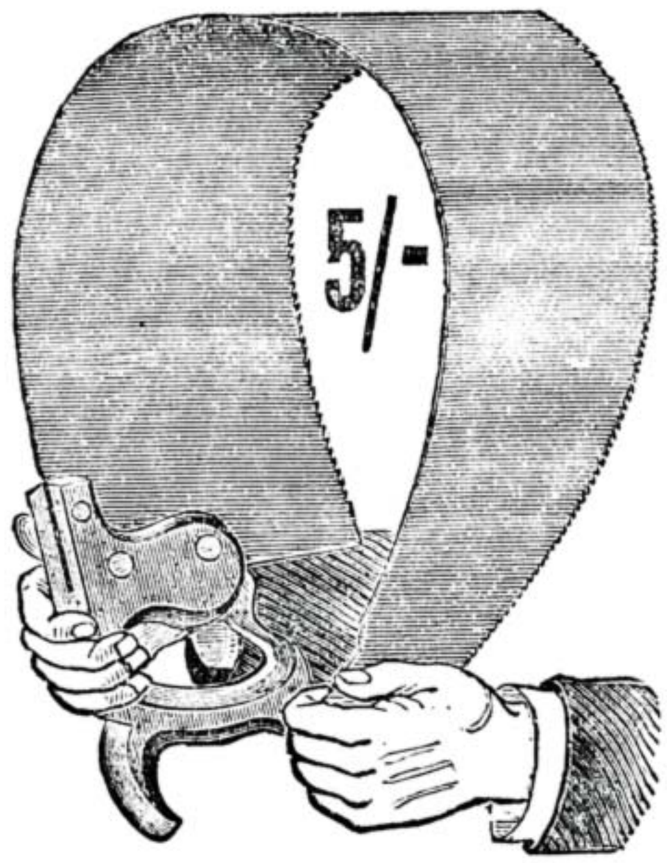

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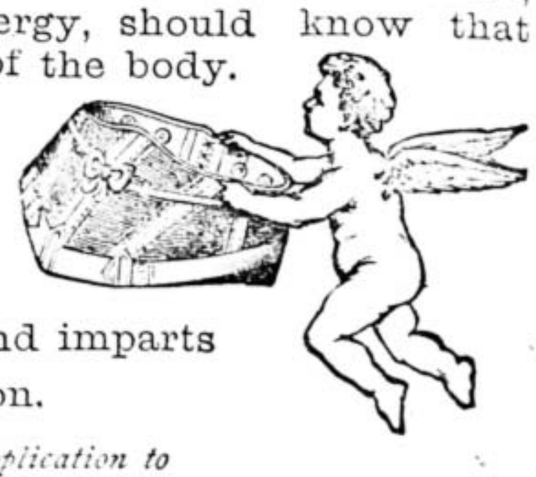

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